AD NUMBER

AD859846

NEW LIMITATION CHANGE

TO

Approved for public release, distribution unlimited

FROM

Distribution authorized to U.S. Gov't. agencies only; Administrative/Operational Use; Sep 1969. Other requests shall be referred to Propellants Laboratory, Picatinny Arsenal, Dover, NJ.

AUTHORITY

USAPA ltr, 8 Oct 1969

COPY NO. 21

TECHNICAL MEMORANDUM 1887

COMPILATION OF INFRARED SPECTRA OF INGREDIENTS OF PROPELLANTS AND EXPLOSIVES

F. PRISTERA
W. FREDERICKS

SEPTEMBER 1969

[redacted]

STATEMENT #3 UNCLASSIFIED

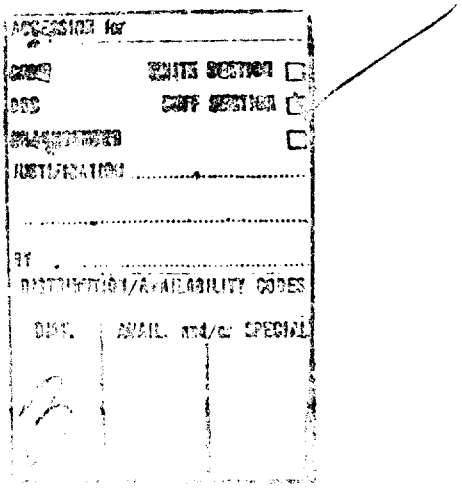
Each transmittal of this document outside the agencies of the U.S. Government must have prior approval of _____

PICATINNY ARSENAL
DOVER, NEW JERSEY

The findings in this report are not to be construed as an official Department of the Army position.

DISPOSITION

Destroy this report when no longer needed. Do not return to the originator.



Technical Memorandum 1887

COMPILATION OF INFRARED SPECTRA OF INGREDIENTS OF PROPELLANTS & EXPLOSIVES

by

F. Pristera

and

W. Fredericks

September 1969

Materials Testing Technology Program

Task Title: Development of Methods of Analysis Using Atomic Absorption, X-Ray Macro Probe, and Far U. V. Spectroscopy

AMCMS Code 4930.11.1161.1

[redacted]

Propellants Laboratory
Feltman Research Laboratories
Picatinny Arsenal
Dover, New Jersey

TABLE OF CONTENTS

OBJECT

To prepare a comprehensive compilations of the infrared spectrograms of the ingredients of Propellants and Explosives which can serve as a reference source to Laboratories engaged in the analysis of Propellants and explosives.

SUMMARY

A comprehensive compilation consisting of 176 infrared spectra of ingredients of propellants and explosives has been prepared and is presented herein. The spectra are arranged in the following groups, which are listed alphabetically, Acetates, Amines, Esters, Metal Organics, Misc., Polymers, Nitro Amines, Nitro Aromatics, Organo Nitrates, Phosphates, Phthalates, Salts, Ureas, Urethanes. Within each group the individual spectra have been arranged in such a way so that related compounds are placed together.

INTRODUCTION

A small compilation consisting of 24 infrared spectra of ingredients of propellants appeared in P.A. Tech Report 1816 "Use of Infrared Spectrophotometry in the Analysis of Propellants". A rather larger compilation of 68 infrared spectra of explosive was presented in P.A. Tech. Report 2254 "Analysis of Explosives by Infrared Spectroscopy", which also described methods and techniques for the analysis of explosives. Since the above mentioned reports were issued many more infrared spectra of ingredients of propellants and explosives have been investigated and prepared. It was therefore considered desirable to prepare a comprehensive compilation of the infrared spectrograms of all the commonly used ingredients of propellants and explosives which can serve as a reference source to Laboratories engaged in the analysis of propellants and explosives.

RESULTS

A comprehensive compilation consisting of 176 infrared spectra of ingredients of propellants and explosives has been prepared and is presented herein. The spectra are arranged in the following groups which are listed alphabetically: Acetates, Amines, Esters, Metal Organics, Misc., Polymers, Nitro Amines, Nitro Aromatics, Organo Nitrates, Phosphates, Phathalates, Salts, Ureas, Urethanes. Within each group the individual spectra have been arranged in such a way so that related compounds are placed together. Thus the mononitrotoluenes are together, so are the dinitro and trinitrotoluenes.

For the convenience of locating the spectrum of a certain compound an index has been prepared which will give the Code No. of the compound which will facilitate finding it. A glance at the "Index" and Code Nos. will suffice to show the simplicity of locating the spectra.

The enclosed compilation includes some compounds which may not be commonly used as ingredients of explosives or propellants but may be present as impurities, may be compounds formed during the manufacturing process or may be compounds that are related to the ones actually used. Thus the compilation includes all the various mono, di and trinitrotoluene isomers. It also includes the different polymorphs of HMX. The inclusion of these substances mentioned above has been done not only for completeness, but also as a possible means of obtaining spectra band correlations.

INDEX TO INFRARED SPECTRA OF INGREDIENTS OF PROPELLANTS AND EXPLOSIVES

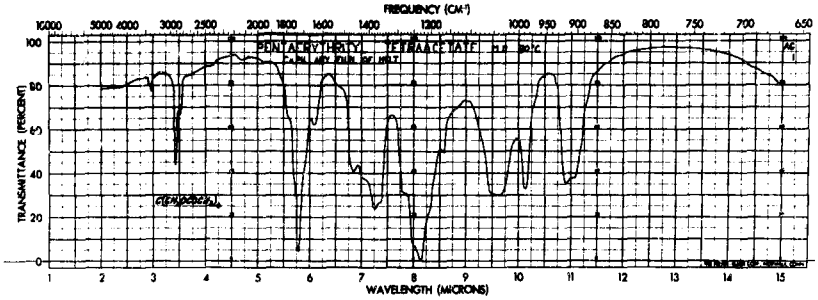
NAME(S)	CODE
Pentaerythrityl Tetraacetate	AC 1
Sucrose Octaacetate	AC 2
Glycerol Triacetate (Triacetin)	AC 3
Ethylene Glycol Monomethyl Ether Acetate (Methyl Cellosolve Acetate)	AC 4
Diphenylamine	Amine 1
N-Nitrosodiphenylamine	Amine 2
Para-Nitrosodiphenylamine	Amine 3
2-Nitrodiphenylamine	Amine 4
4-Nitrodiphenylamine	Amine 5
2,4-Dinitrodiphenylamine	Amine 6
2,4' Dinitrodiphenylamine	Amine 7
Diethyl Maleate	Ester 1
Di-N-Butyl-d-Tartrate	Ester 2
Diethyl-d-Tartrate	Ester 3
Diethyl Hexanedioic Acid Ester (Diethyl Adipate)	Ester 4
Dimethyl Hexanedioic Acid Ester (Dimethyl adipate)	Ester 5
Diethyl Carbonic Acid Ester (Diethyl Carbonate)	Ester 6
Triethyl Citrate	Ester 7
Diethyl Fumarate	Ester 8
Decanedioic Acid Ethyl Hexyl Ester (Ethyl Hexyl Sebacate)	Ester 9
Decanedioic Acid Dimethyl Ester (Dimethyl Sebacate)	Ester 10
N-Butyl Stearate	Ester 11
Hexanedioic Acid Dipropyl Ester (Di-N-propyl adipate)	Ester 12
Ethylene Carbonate	Ester 13
Lead Acetyl Salicylate	Metal Organo 1
Lead Salicylate	Metal Organo 2
Lead Dihydroxy Benzoate (Lead Resorcylate)	Metal Organo 3
Basic Cupric Salicylate	Metal Organo 4
Lithium Stearate	Metal Organo 5
Lead Stearate	Metal Organo 6
Magnesium Stearate	Metal Organo 7
Zinc Stearate	Metal Organo 8
Lead Meta Toluate	Metal Organo 9
Lead Rincinoleate	Metal Organo 10
Mono Basic Lead Dihydroxy Benzoate (Mono Basic Lead Beta Resorcylate)	Metal Organo 11
Ferric Acetonyl Acetonate	Metal Organo 12

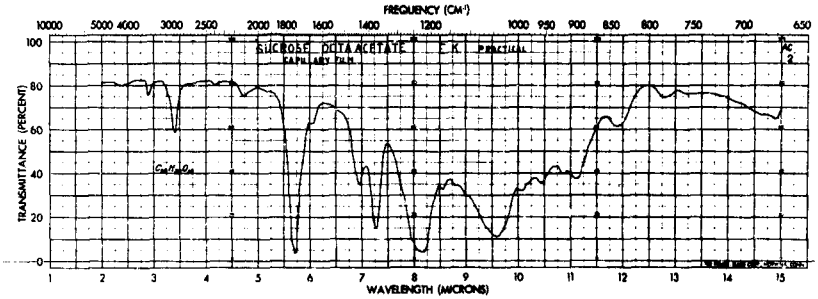
NAME(S)	CODE
Stearic Acid	Misc 1
Carbazole	Misc 2
Diphenyl Guanidine	Misc 3
Oxamide	Misc 4
Nitroguanidine	Misc 5
Methyl Nitroguanidine	Misc 6
Decaborane	Misc 7
Melamine	Misc 8
5-Aminotetrazole	Misc 9
Cyano Guanidine (Dicyandiamide)	Misc 10
Diphenyl formamide	Misc 11
Phthalide	Misc 12
Cyclotrimethylene Trinitroso Amine,"R" Salt	Misc 13
Phenazine	Misc 14
Camphor	Misc 15
Hexamethylene Tetramine	Misc 16
Beta-Resorcylic Acid	Misc 17
1,3 Dihydroxy Benzene (Resorcinol)	Misc 18
Tolyl-2,4-Diisocyanate	Misc 19
Nitroisobutyl Glycerine,"Nib" Triacrylate	Misc 20
Methyl Cellulose	Poly 1
Ethyl Cellulose	Poly 2
Cyanoethyl Cellulose	Poly 3
Ethylenedinitramine ("Edna") (Haleite)	Nitro Amine 1
Methylenedinitramine,"Medina"	Nitro Amine 2
1,3,5 Triazine Hexahydro 1,3,5-Trinitro (RDX)	Nitro Amino 3
Cyclotetramethylenetetranitramine (Beta HMX)	Nitro Amino 4
Cyclotetramethylenetetranitramine (Alpha HMX)	Nitro Amino 5
Cyclotetramethylenetetranitramine (Gamma HMX)	Nitro Amino 6
N-Methyl-N, 2,4,6-Tetranitroaniline	Nitro Amino 7
(Tetryl)	Nitro Amino 7
Monomethyl Haleite	Nitro Amino 8
Dimethyl Haleite	Nitro Amino 9
M-Nitroanisole	Nitro Arom 1
P-Nitroanisole	Nitro Arom 2
2,4-Dinitroanisole	Nitro Arom 3
2,4,6-Trinitroanisole	Nitro Arom 4
Nitrobenzene	Nitro Arom 5
M-Dinitrobenzene	Nitro Arom 6
P-Dinitrobenzene	Nitro Arom 7
1,3,5-Trinitrobenzene	Nitro Arom 8
2-Nitroethylbenzene	Nitro Arom 9
4-Nitroethylbenzene	Nitro Arom 10
2,4-Dinitroethylbenzene	Nitro Arom 11
2,4,6-Trinitroethylbenzene	Nitro Arom 12

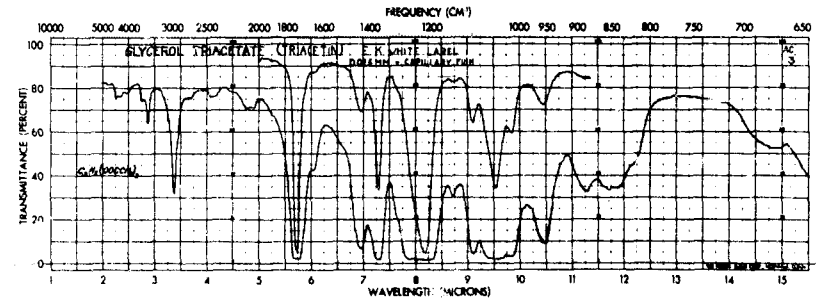
NAME(S)	CODE
Alpha Nitronapthalene	Nitro Arom 13
1,5-Dinitronapthalene	Nitro Arom 14
1,8 Dinitronapthalene	Nitro Arom 15
1,3,8-Trinitronapthalene	Nitro Arom 16
2-Nitrotoluene	Nitro Arom 17
3-Nitrotoluene	Nitro Arom 18
4-Nitrotoluene	Nitro Arom 19
2,3-Dinitrotoluene	Nitro Arom 20
2,4-Dinitrotoluene	Nitro Arom 21
2,5-Dinitrotoluene	Nitro Arom 22
2,6-Dinitrotoluene	Nitro Arom 23
3,4-Dinitrotoluene	Nitro Arom 24
3,5-Dinitrotoluene	Nitro Arom 25
2,3,4-Trinitrotoluene	Nitro Arom 26
2,3,5-Trinitrotoluene	Nitro Arom 27
2,3,6 Trinitrololuene	Nitro Arom 28
2,4,5 Trinitrotoluene	Nitro Arom 29
2,4,6-Trinitrotoluene	Nitro Arom 30
3,4,5-Trinitrotoluene	Nitro Arom 31
2-Nitrobenzoic Acid	Nitro Arom 32
3-Nitrobenzoic Acid	Nitro Arom 33
4-Nitrobenzoic Acid	Nitro Arom 34
2,4 Dinitrobenzoic Acid	Nitro Arom 35
3,5 Dinitrobenzoic Acid	Nitro Arom 36
2,4,6-Trinitrobenzoic Acid	Nitro Arom 37
Diaminotrinitrobenzene	Nitro Arom 38
1,Nitro Carbazole	Nitro Arom 39
3,Nitro Carbazole	Nitro Arom 40
1,3,6,8 Tetranitrocarbazole	Nitro Arom 41
2,4,5,7 Tetranitrocarbazole	Nitro Arom 42
Para-Nitro-N-Methyl Aniline	Nitro Arom 43
1,2,4-Butanetriol trinitrate	Organo Nitrate 1
Nitrocellulose	Organo Nitrate 2
Ethyleneglycoldinitrate	Organo Nitrate 3
Diethyleneglycoldinitrate (DEGN)	Organo Nitrate 4
Triethylenegl ol dinitrate (TEGN)	Organo Nitrate 5
Mannitol Hexanitrate	Organo Nitrate 6
Metrioltrinitrate	Organo Nitrate 7
Glycerol Trinitrate (Nitroglycerine)	Organo Nitrate 8
Pentaerythritol Tetranitrate (PETN)	Organo Nitrate 9
Pentaerythritol dinitrate (PEDN)	Organo Nitrate 10
Pentaerythritol trinitrate (Petrin)	Organo Nitrate 11
Pentaerythritol trinitrate (Petrin) Acrylate	Organo Nitrate 12
Tetramethylolcyclopentanone Tetranitrate (Fivonite)	Organo Nitrate 13
Tetramethylolcyclohexanol pentanitrate (Sixolite)	Organo Nitrate 14
Dipentaerythritolhexanitrate	Organo Nitrate 15

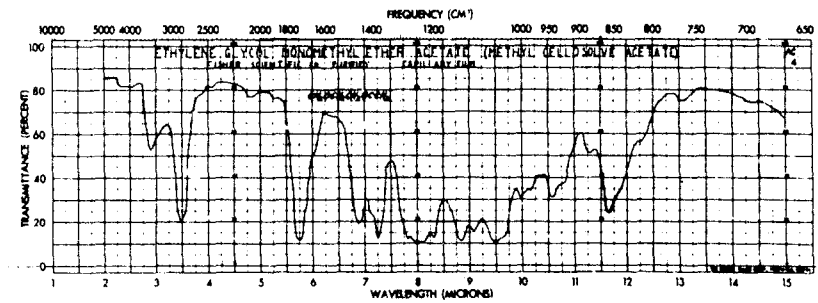
NAME(S)	CODE
Tripentaerythritoloctanitrate	Organo Nitrate 16
Propyleneglycoldinitrate	Organo Nitrate 17
Nitroisobutylglycerine "NIB" dinitrate	Organo Nitrate 18
Nitroisobutylglycerine "NIB" Trinitrate	Organo Nitrate 19
Nitroisobutylglycerine "NIB"dinitrate acrylate	Organo Nitrate 20
Nitroisobutylglycerine "NIB" dinitrate polyacrylate	Organo Nitrate 21
Trioctylphosphate	Phos 1
Triphenylphosphate	Phos 2
Tri-o-tolylphosphate	Phos 3
Tri-cresylphosphate	Phos 4
Tri-p-cresylphosphate	Phos 5
Dimethylphthalate	Phth 1
Diethylphthalate	Phth 2
Dibutylphthalate	Phth 3
Diisobutylphthalate	Phth 4
Di-N-Amylphthalate	Phth 5
Diisoamylphthalate	Phth 6
Dicaprylphthalate	Phth 7
Dicyclohexylphthalate	Phth 8
Diphenylphthalate	Phth 9
Dibenzylphthalate	Phth 10
Diisooctylphthalate	Phth 11
Di-N-octylphthalate	Phth 12
Di-2-Ethylhexylphthalate	Phth 13
Potassium perchlorate	Salt 1
Ammonium perchlorate	Salt 2
Ammonium Nitrate	Salt 3
Diammonium haleite	Salt 4
Ammonium picrate	Salt 5
Guanidine perchlorate	Salt 6
Guanidine nitrate	Salt 7
Triaminoguanidine nitrate	Salt 8
Triaminoguanidine picrate	Salt 9
Triaminoguanidine perchlorate	Salt 10
Triaminoguanidine haleite "ethylene dinitramine"	Salt 11
Ethylenediamine dinitrate	Salt 12
Urea nitrate	Salt 13
Hydrazine nitrate	Salt 14
Hexamethylenetetramine dinitrate	Salt 15
S-Diethyldiphenylurea (Ethyl centralite)	Urea 1
S-Dimethyldiphenylurea (Methyl centralite)	Urea 2
AS-Dimethyldiphenylurea	Urea 3
(S)N,N' Di-p-Tolylurea	Urea 4
Monophenylurea	Urea 5
N,N-Diphenylurea	Urea 6
N,N' Diphenylurea	Urea 7
Carbamic Acid Ethylphenyl ethyl ester (N, Ethyl-N-Phenyl Urethane)	Urethal

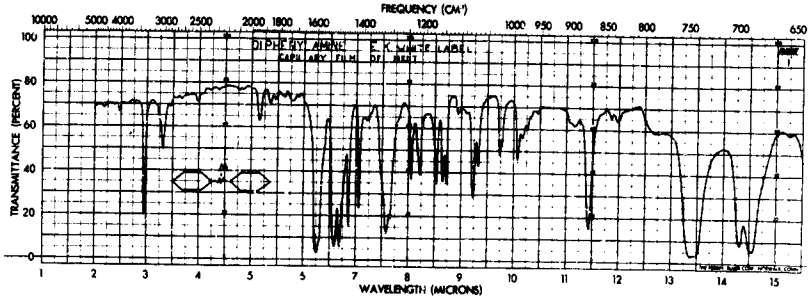
NAME(S)	CODE
Carbamic Acid diphenyl ethyl ester (diphenylurethane)	Ureth 2
Carbanilic Acid Ethyl Ester (Phenylurethane)	Ureth 3
Carbamic Acid-o-tolyl ethyl ester (o-tolylurethane)	Ureth 4

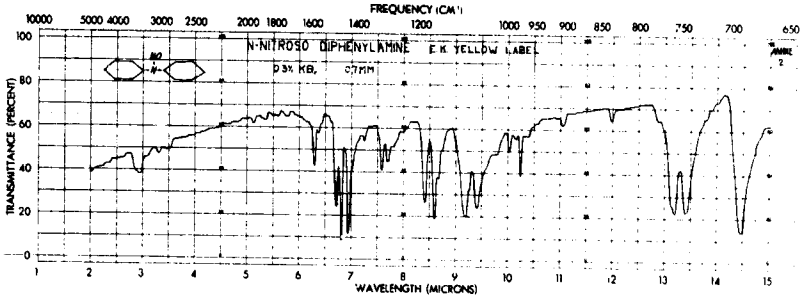

FREQUENCY (CM⁻¹)
PENTAERYTHRITYL TETRAACETATE
CAPILLARY FILM OF MELT
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

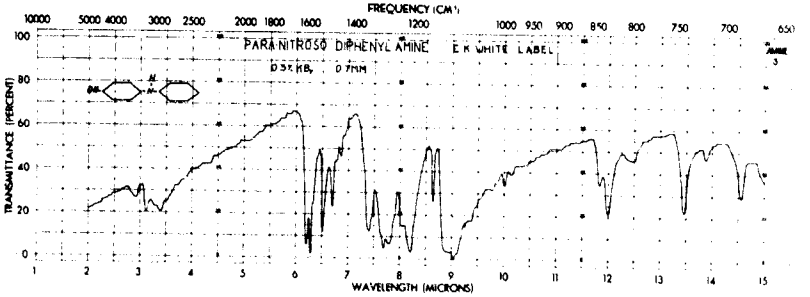

FREQUENCY (CM⁻¹)
SUCROSE OCTAACETATE E.K. PRACTICAL
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

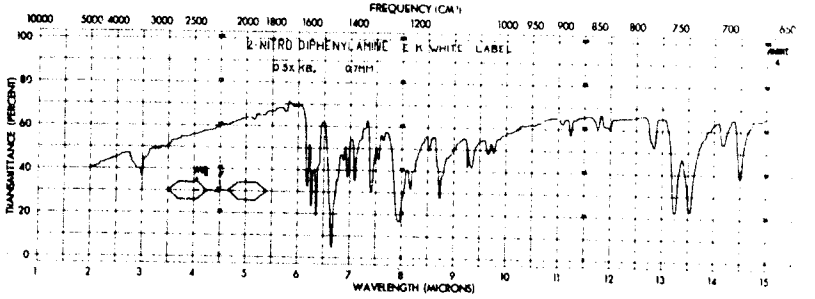

FREQUENCY (CM⁻¹)
GLYCEROL TRIACETATE (TRIACETIN) E.K. WHITE LABEL
DOUBLE PLATE + CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

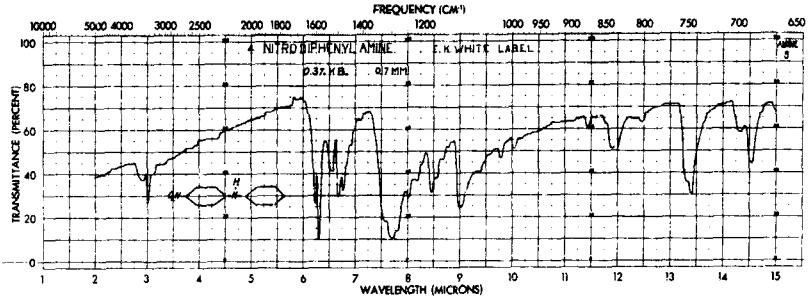

FREQUENCY (CM⁻¹)
ETHYLENE GLYCOL MONOMETHYL ETHER ACETATE (METHYL CELLOSOLVE ACETATE)
FISHER SCIENTIFIC CO. PURIFIED CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

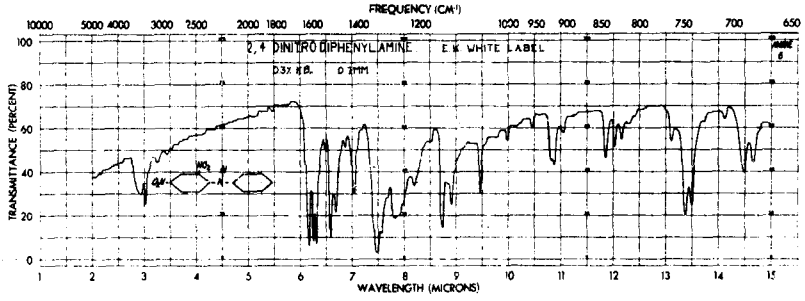

FREQUENCY (CM⁻¹)
DIPHENYL AMINE E.K. WHITE LABEL
CAPILLARY FILM OF MELT
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

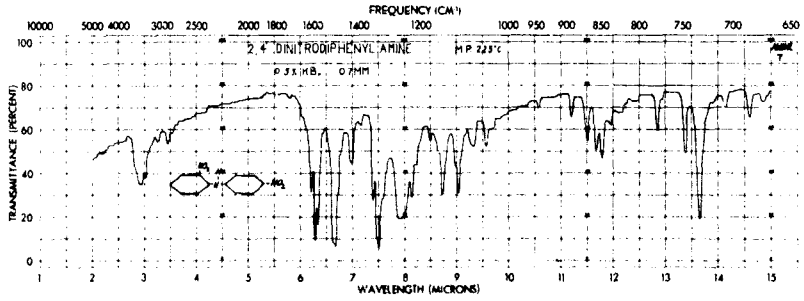

FREQUENCY (CM⁻¹)
N-NITROSO DIPHENYLAMINE E.K. YELLOW LABEL
0.5% KB, 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

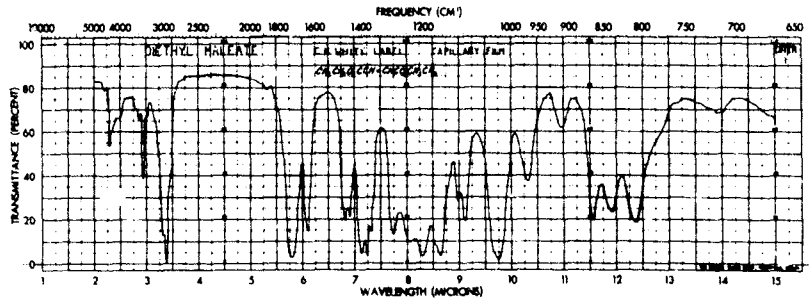

FREQUENCY (CM⁻¹)
PARA NITROSO DIPHENYL AMINE E.K. WHITE LABEL
0.5% KB, 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

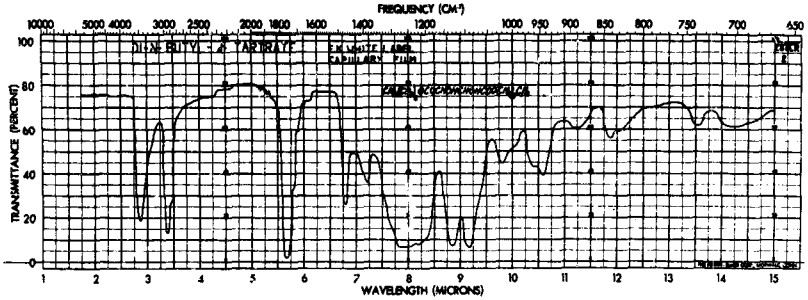

FREQUENCY (CM⁻¹)
2-NITRO DIPHENYLAMINE E.K. WHITE LABEL
0.5% KB, 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

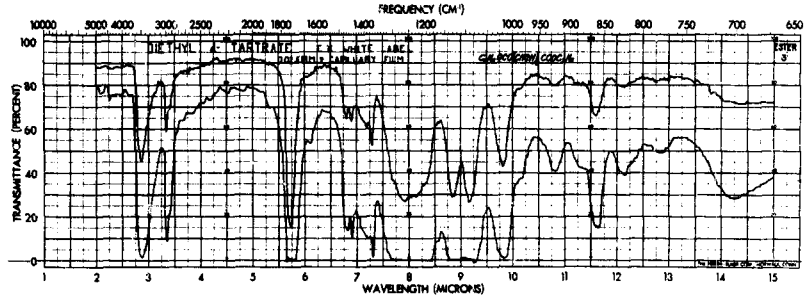

FREQUENCY (CM⁻¹)
4 NITRODIPHENYL AMINE
E.K. WHITE LABEL
0.3% K.B.
0.7 MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

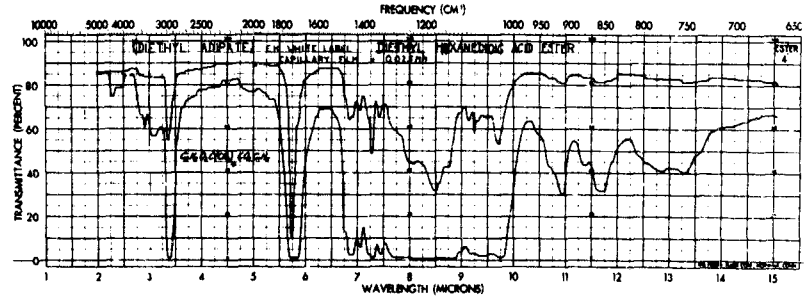

FREQUENCY (CM⁻¹)
2,4 DINITRODIPHENYLAMINE
E.K. WHITE LABEL
0.3% K.B.
0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

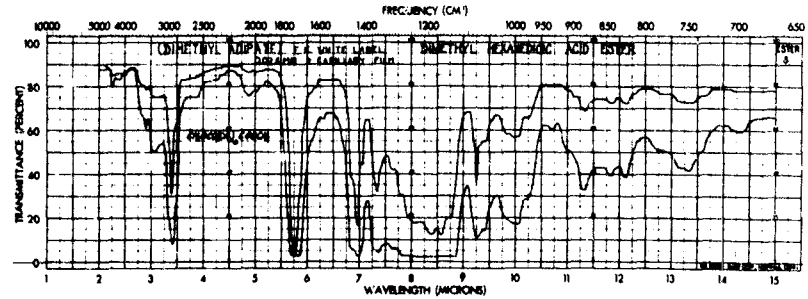

FREQUENCY (CM⁻¹)
2,4 DINITRODIPHENYL AMINE
M.P. 223°C
0.3% K.B.
0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

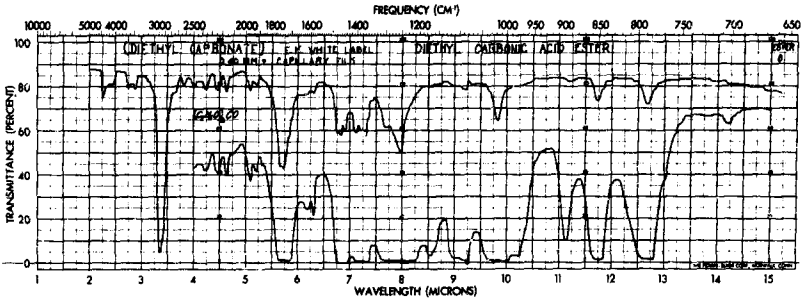

FREQUENCY (CM⁻¹)
DIETHYL MALEATE
E.K. WHITE LABEL
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

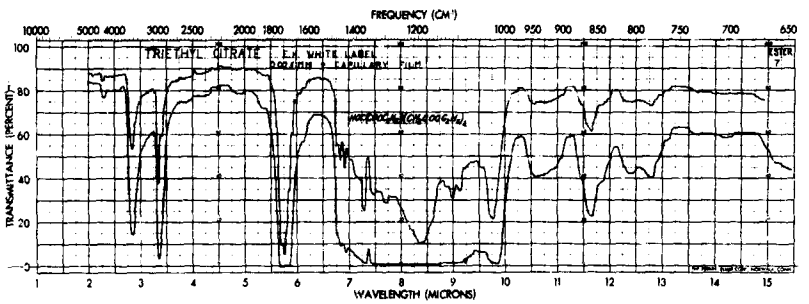

FREQUENCY (CM⁻¹)
DIETHYL L-TARTRATE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

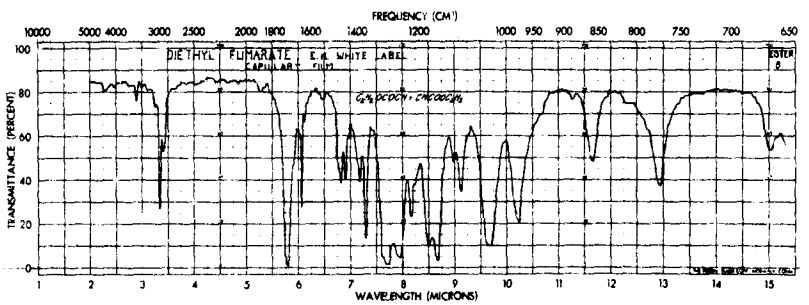

FREQUENCY (CM⁻¹)
DIETHYL L-TARTRATE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

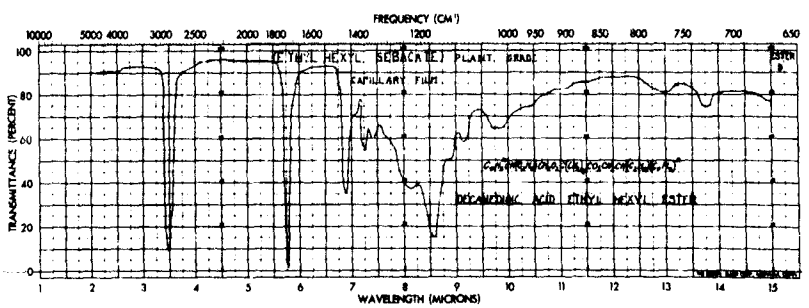

FREQUENCY (CM⁻¹)
DIETHYL ADIPATE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

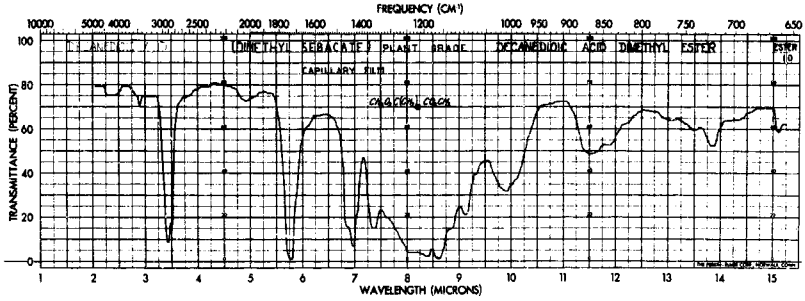

FREQUENCY (CM⁻¹)
DIETHYL ADIPATE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

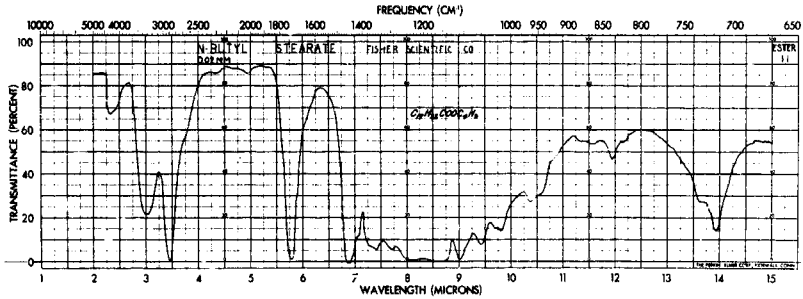

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
(DIETHYL CARBONATE) E.K. WHITE LABEL
DIETHYL CARBONIC ACID ESTER
ESTER 6
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

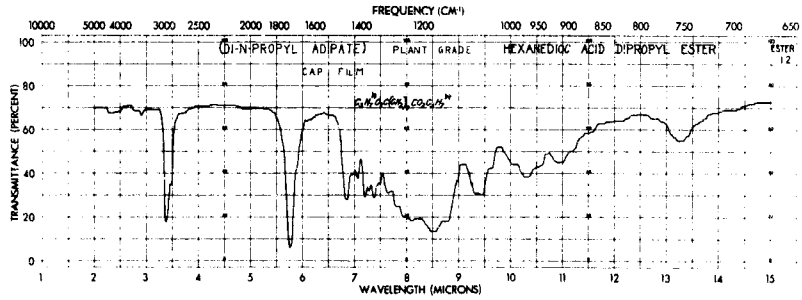

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRIETHYL CITRATE E.K. WHITE LABEL
ESTER 7
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

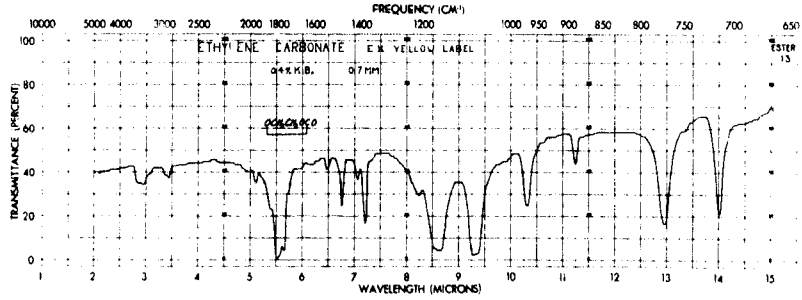

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DIETHYL FUMARATE E.K. WHITE LABEL
CAPILLARY FILM
ESTER 9
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

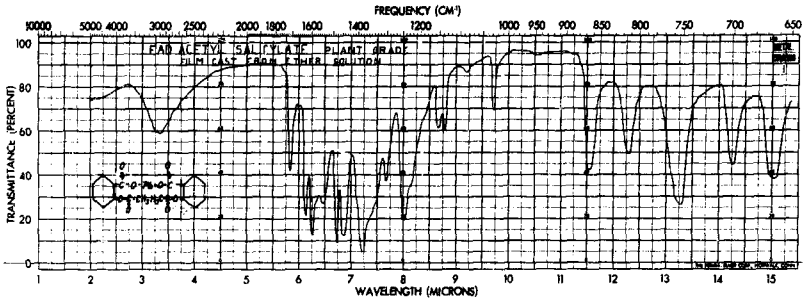

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
(ETHYL HEXYL SEBACATE) PLANT. GRADE
CAPILLARY FILM
ESTER 8
DECANEDIOIC ACID ETHYL HEXYL ESTER
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

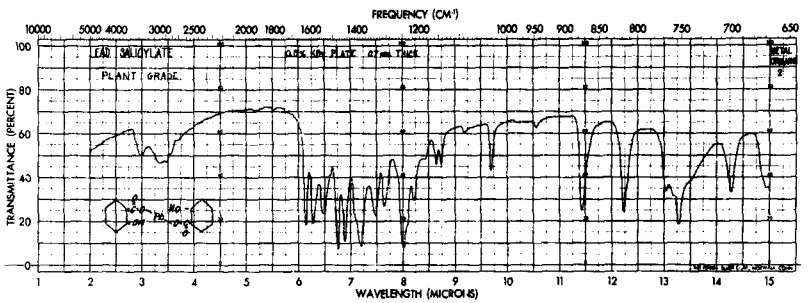

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
100
80
60
40
20
0
TRANSMITTANCE (PERCENT)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
DIMETHYL SEBACATE) PLANT GRADE
DECANEDIOIC ACID DIMETHYL ESTER
CAPILLARY FILM
ESTER 10

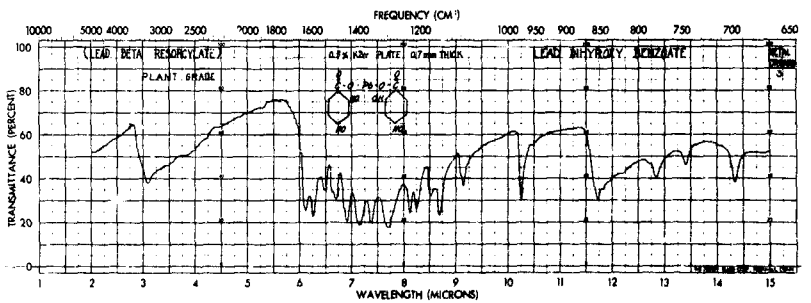

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
100
80
60
40
20
0
TRANSMITTANCE (PERCENT)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
N-BUTYL STEARATE
FISHER SCIENTIFIC CO
0.02 MM
ESTER 11

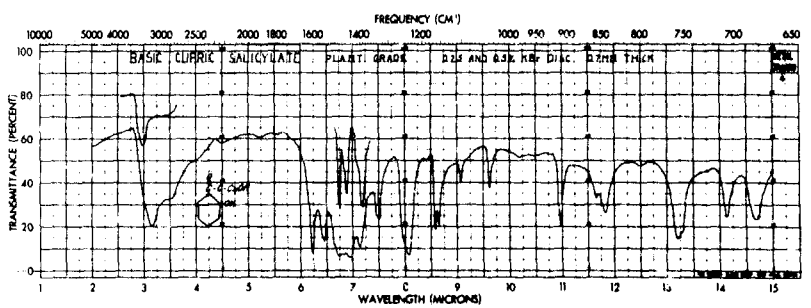

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
100
80
60
40
20
0
TRANSMITTANCE (PERCENT)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
(DI-N-PROPYL ADIPATE) PLANT GRADE
HEXANEDIOIC ACID DIPROPYL ESTER
CAP FILM
ESTER 12

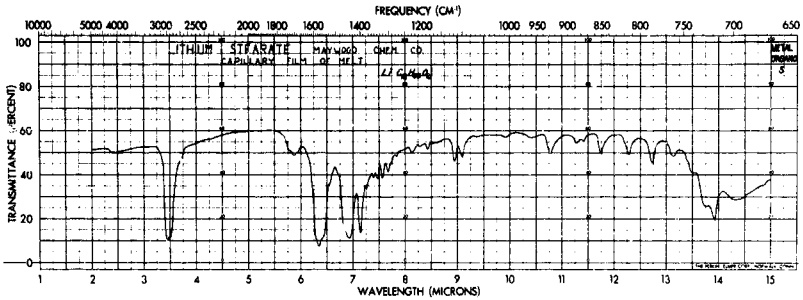

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
100
80
60
40
20
0
TRANSMITTANCE (PERCENT)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
ETHYLENE CARBONATE EK YELLOW LABEL
0.7 MM
ESTER 13

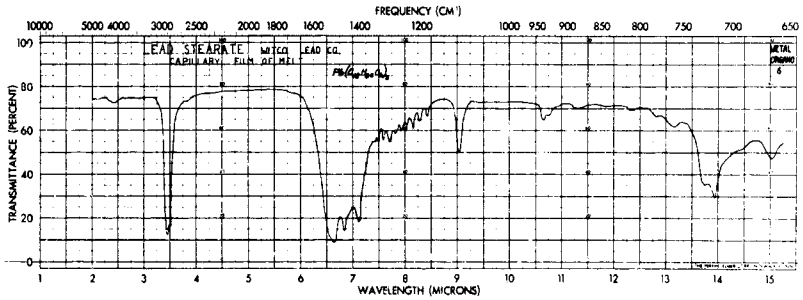

FREQUENCY (CM⁻¹)
LEAD ACETYL SALICYLATE PLANT GRADE
FILM CAST FROM ETHER SOLUTION
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

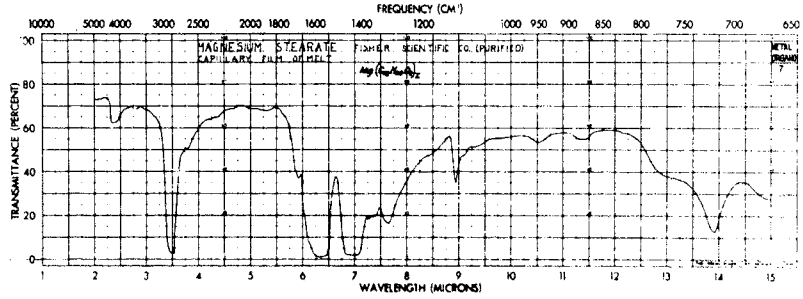

FREQUENCY (CM⁻¹)
LEAD SALICYLATE
PLANT GRADE
0.5% KBr PLATE .27 mm THICK
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

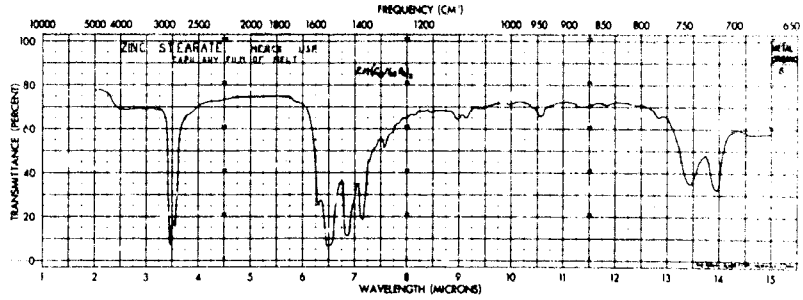

FREQUENCY (CM⁻¹)
LEAD BETA RESORCYLATE
PLANT GRADE
0.5% KBr PLATE .27mm THICK
LEAD ANTHRANILATE BENZOATE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

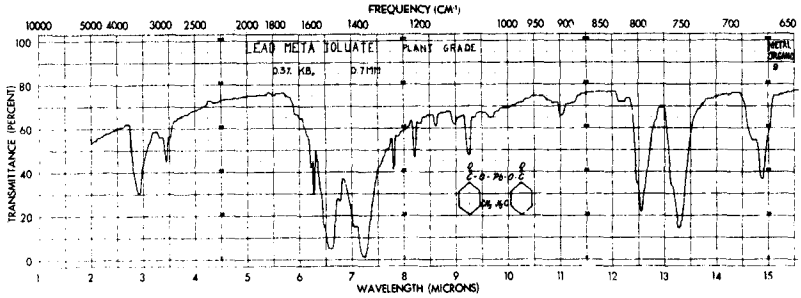

FREQUENCY (CM⁻¹)
BASIC CUPRIC SALICYLATE
PLANT GRADE
0.25 AND 0.5% KBr DISC. 0.2MM THICK
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

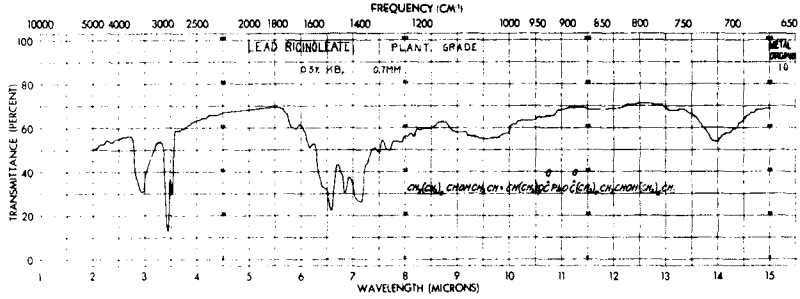

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
LITHIUM STEARATE MAYWOOD CHEM. CO.
CAPILLARY FILM OF MELT
METAL ORGANIC 5
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

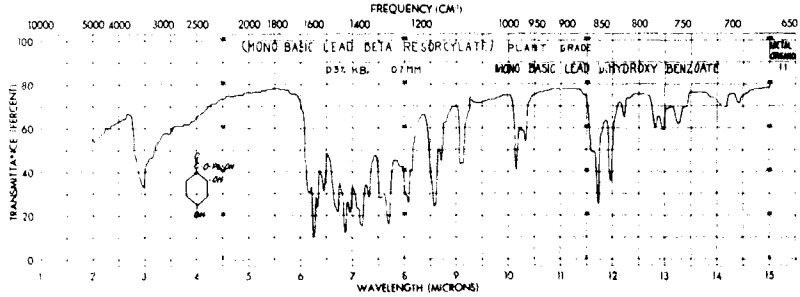

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
LEAD STEARATE MATCO LEAD CO.
CAPILLARY FILM OF MELT
METAL ORGANIC 6
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

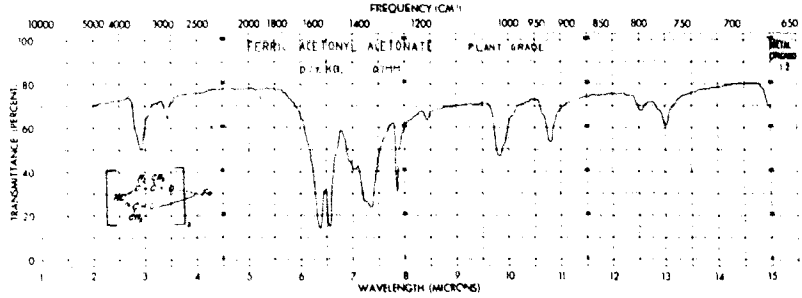

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
MAGNESIUM STEARATE FISHER SCIENTIFIC CO. (PURIFIED)
CAPILLARY FILM OF MELT
METAL ORGANIC 7
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

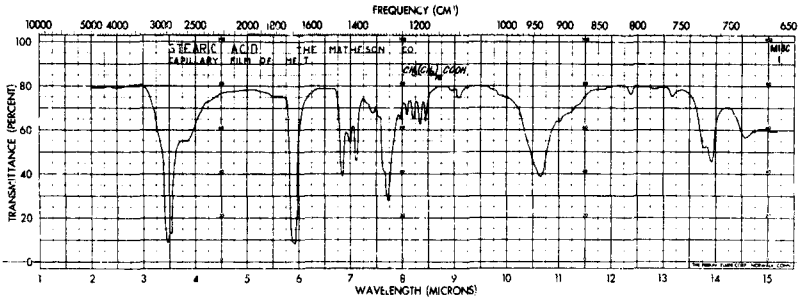

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
ZINC STEARATE MEARS U.S.P.
CAPILLARY FILM OF MELT
METAL ORGANIC 8
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

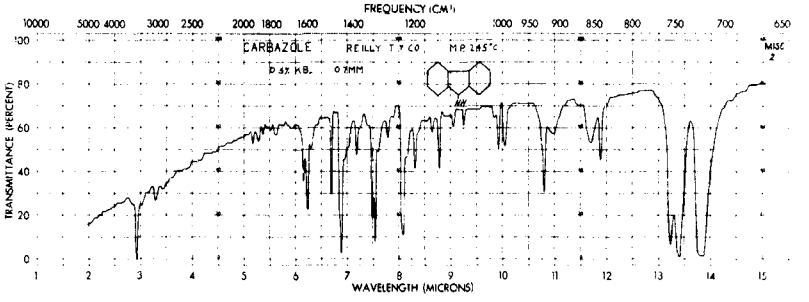

FREQUENCY (CM⁻¹)
LEAD META TOLUATE PLANT GRADE
0.5% KB, 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

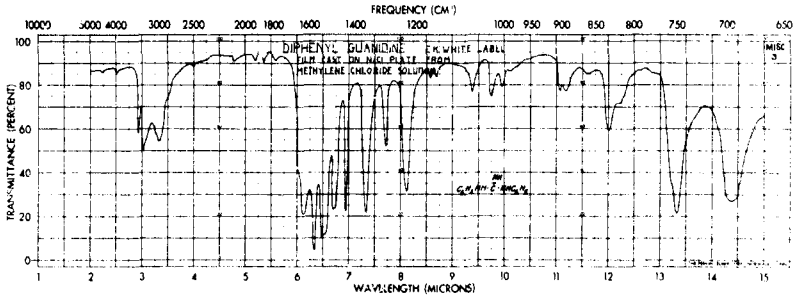

FREQUENCY (CM⁻¹)
LEAD RICINOLEATE PLANT GRADE
0.5% KB, 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

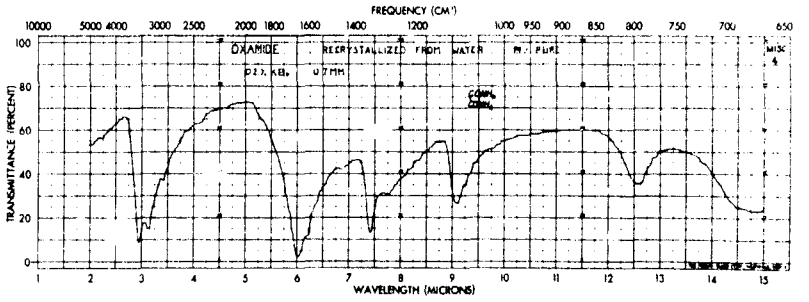

FREQUENCY (CM⁻¹)
MONO BASIC LEAD BETA RESORCYLATE PLANT GRADE
0.5% KB, 0.7MM
MONO BASIC LEAD DIHYDROXY BENZOATE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

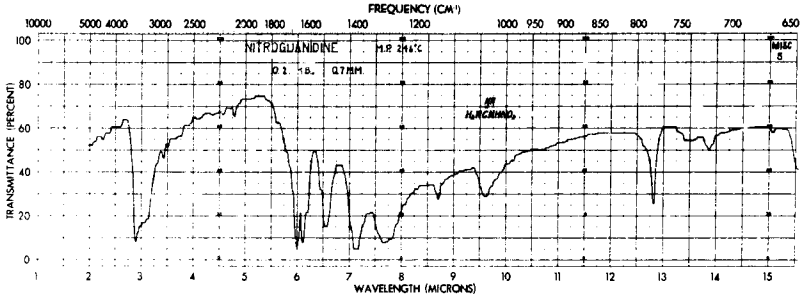

FREQUENCY (CM⁻¹)
FERRIC ACETONYL ACETONATE PLANT GRADE
0.5% KB, 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

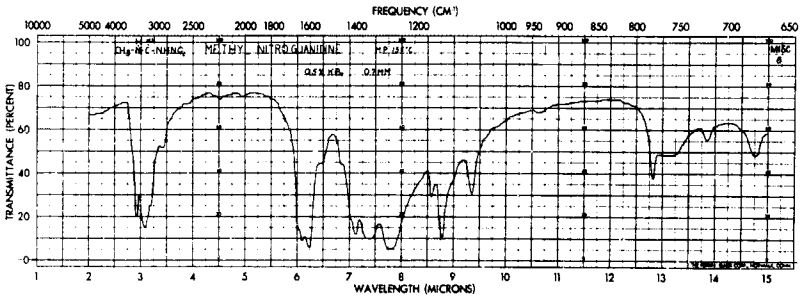

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
STEARIC ACID THE MATHESON CO.
CAPILLARY FILM OF MELT
MISC 1
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

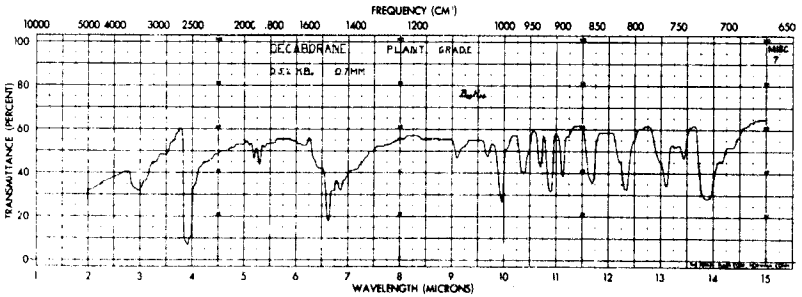

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
CARBAZOLE REILLY TAR & CHEM. CO. M.P. 245°C
0.5% KBr 0.7MM
MISC 2
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

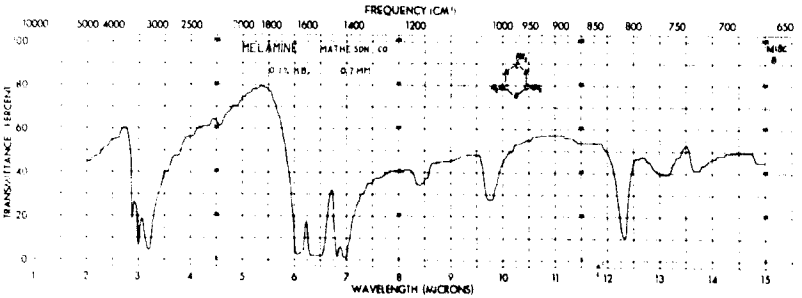

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DIPHENYL GUANIDINE EASTMAN WHITE LABEL
FILM CAST ON NaCl PLATE FROM METHYLENE CHLORIDE SOLUTION
MISC 3
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

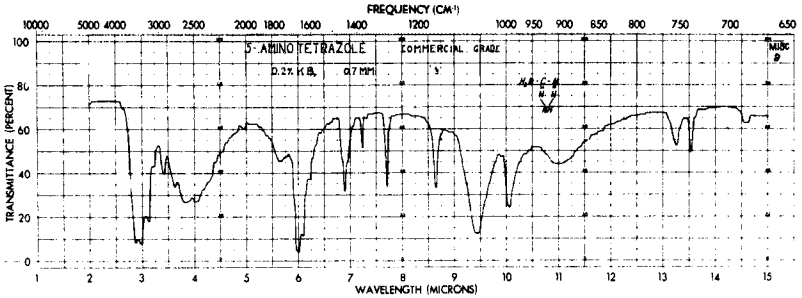

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
OXAMIDE RECRYSTALLIZED FROM WATER M.P. PURE
0.2% KBr 0.7MM
MISC 4
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

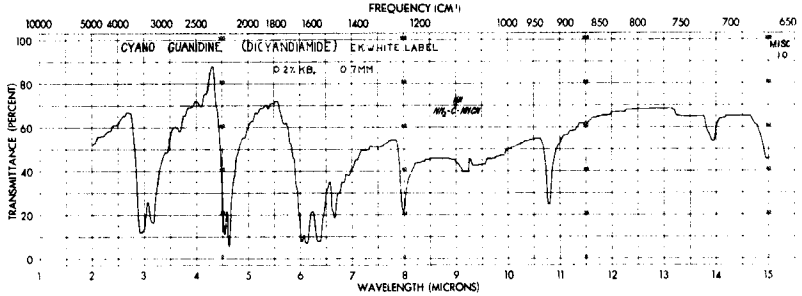

FREQUENCY (CM⁻¹)
NITROGUANIDINE
0.2% KB, 0.7MM
MISC 8
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

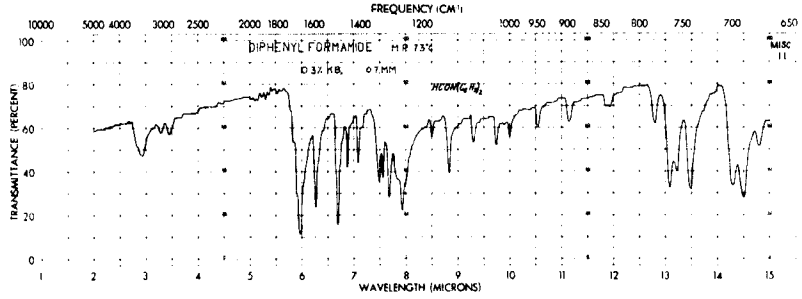

FREQUENCY (CM⁻¹)
METHYL NITROGUANIDINE
0.5% KB, 0.2MM
MISC 6
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

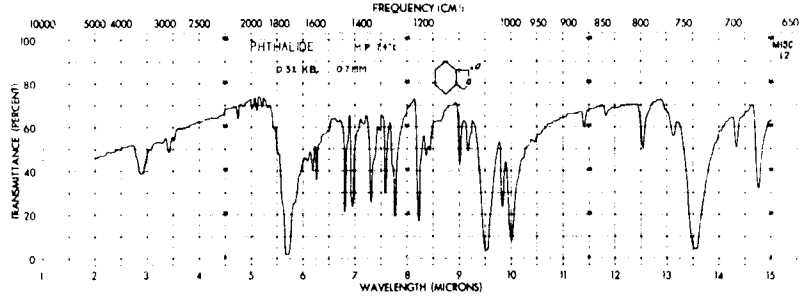

FREQUENCY (CM⁻¹)
DECABORANE
PLANT GRADE
0.5% KB, 0.7MM
MISC 7
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

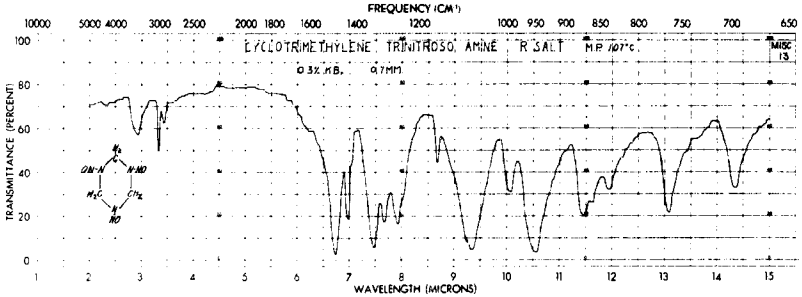

FREQUENCY (CM⁻¹)
MELAMINE
MATHESON CO
0.2% KB, 0.7 MM
MISC 8
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

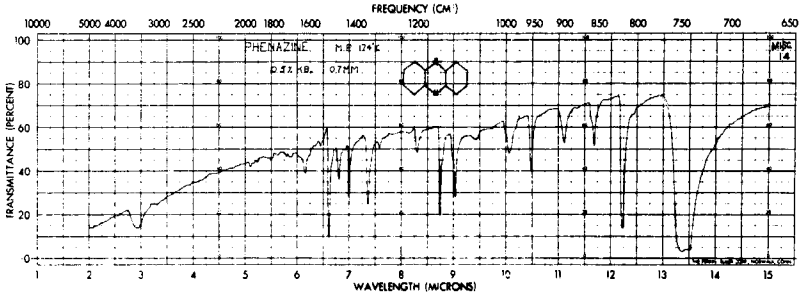

FREQUENCY (CM⁻¹)
5-AMINOTETRAZOLE
COMMERCIAL GRADE
0.2% KB, 0.7 MM
MISC 9
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

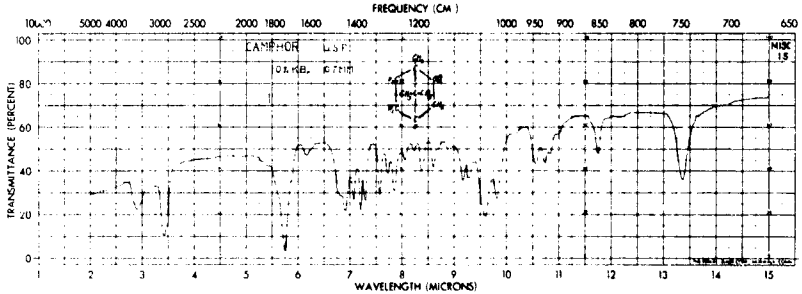

FREQUENCY (CM⁻¹)
CYANO GUANIDINE (DICYANDIAMIDE) EK WHITE LABEL
0.2% KB, 0.7 MM
MISC 10
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

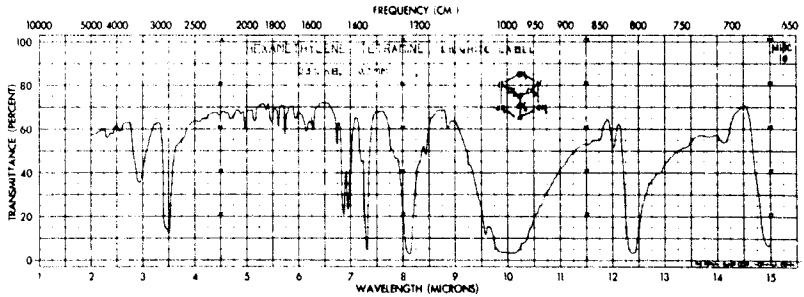

FREQUENCY (CM⁻¹)
DIPHENYL FORMAMIDE MP 73°C
0.3% KB, 0.7 MM
MISC 11
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

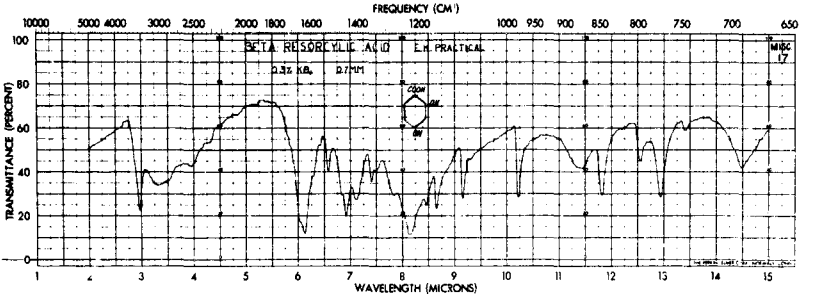

FREQUENCY (CM⁻¹)
PHTHALIDE MP 74°C
0.3% KB, 0.7 MM
MISC 12
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

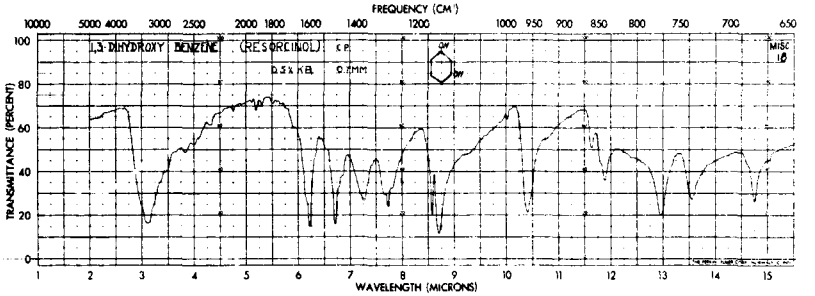

FREQUENCY (CM⁻¹)
CYCLOTRIMETHYLENE TRINITROSO AMINE "R" SALT M.P. 107°C.
MISC. 13
0.3% KB. 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

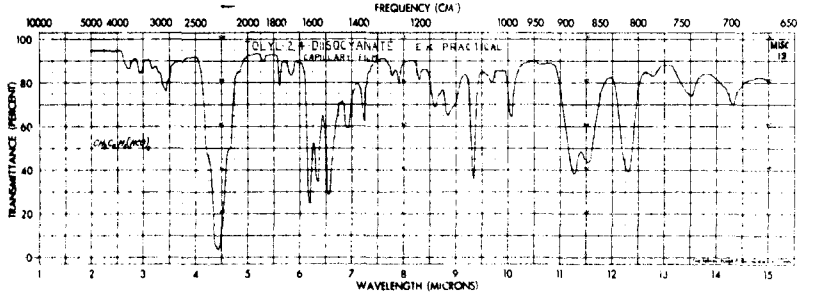

FREQUENCY (CM⁻¹)
PHENAZINE M.P. 174°C
MISC. 14
0.5% KB. 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

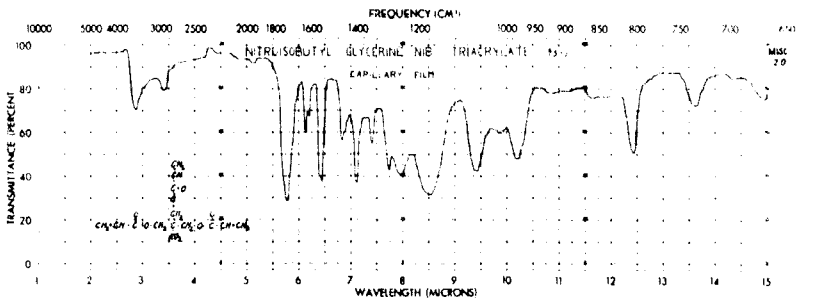

FREQUENCY (CM⁻¹)
CAMPHOR U.S.P.
MISC. 15
0.1% KB. 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

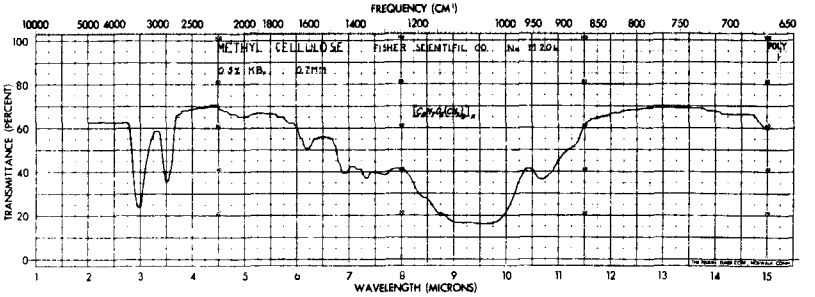

FREQUENCY (CM⁻¹)
MISC. 16
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

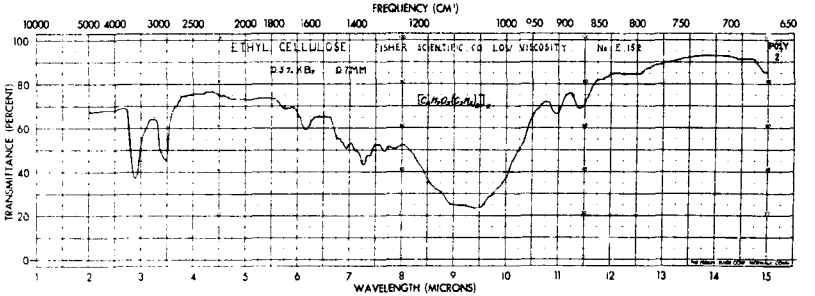

FREQUENCY (CM⁻¹)
BETA RESORCYLIC ACID E.R. PRACTICAL
0.3% KB. 0.7MM
MISC 17
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

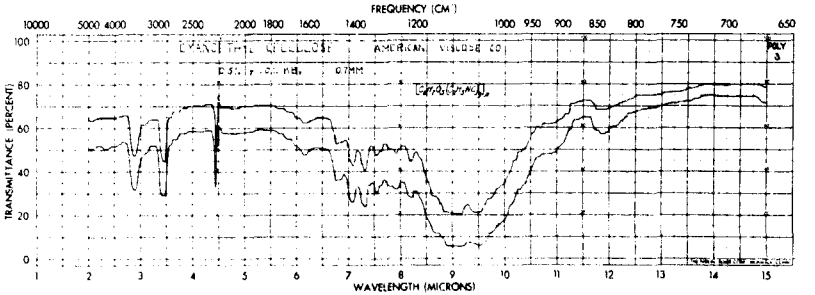

FREQUENCY (CM⁻¹)
1,3 DIHYDROXY BENZENE (RESORCINOL) C.P.
0.5% KB. 0.7MM
MISC 16
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

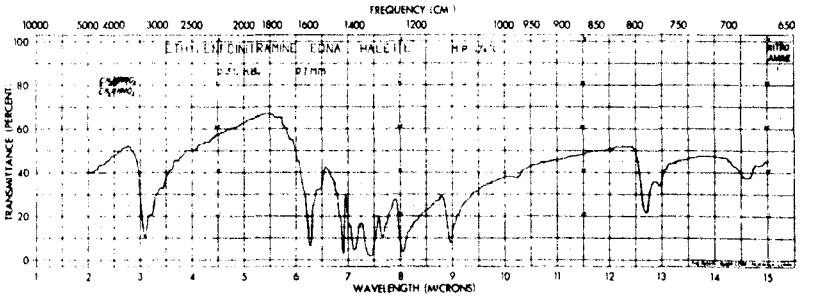

FREQUENCY (CM⁻¹)
TOLYL 2,4 DIISOCYANATE E.R. PRACTICAL
CAPILLARY FILM
MISC 13
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

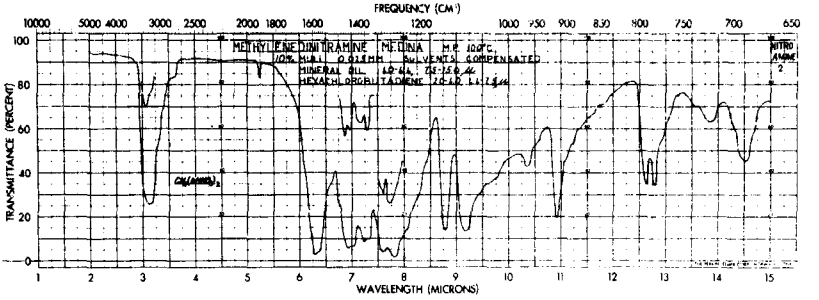

FREQUENCY (CM⁻¹)
NITRILOBUTYL GLYCERINE TRIACRYLATE
CAPILLARY FILM
MISC 20
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

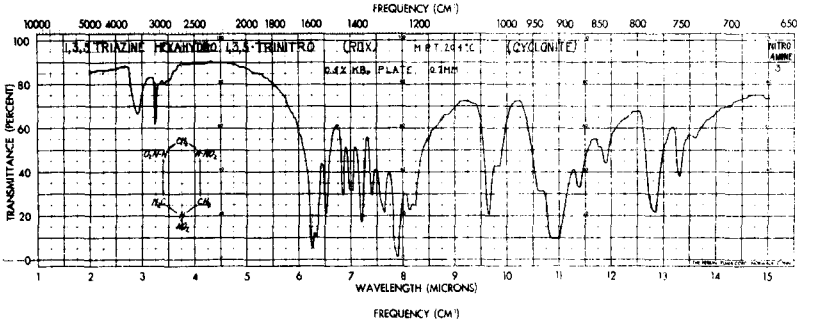

FREQUENCY (CM⁻¹)
METHYL CELLULOSE
FISHER SCIENTIFIC CO.
0.5% KBr, 0.2MM
POLY 1
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

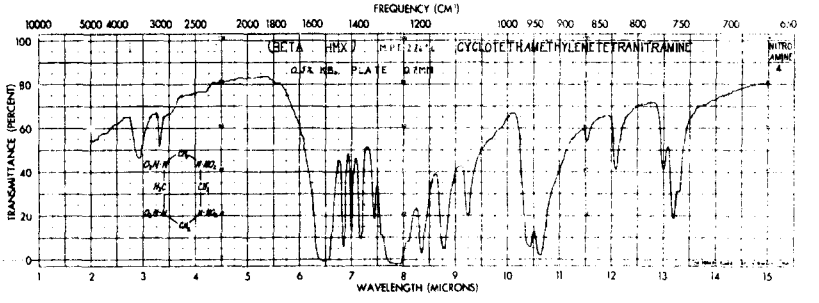

FREQUENCY (CM⁻¹)
ETHYL CELLULOSE
FISHER SCIENTIFIC CO LOW VISCOSITY
0.5% KBr, 0.7MM
POLY 2
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

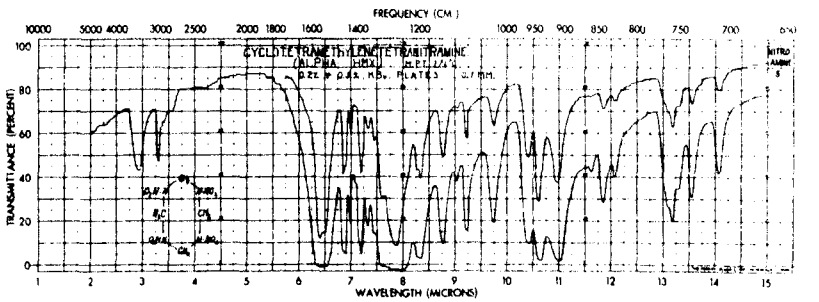

FREQUENCY (CM⁻¹)
AMERICAN VISCOSE CO
POLY 3
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

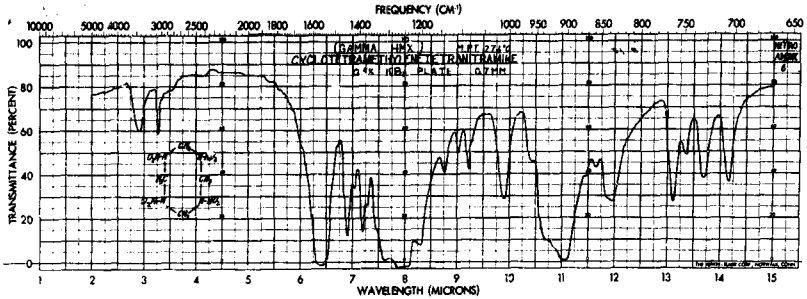

FREQUENCY (CM⁻¹)
NITRO AMINE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

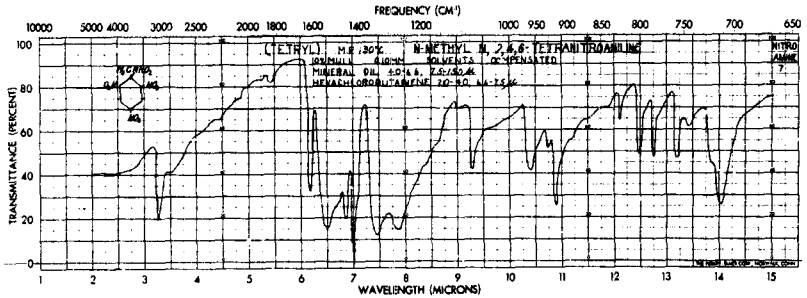

FREQUENCY (CM⁻¹)
METHYLENEDINITRAMINE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

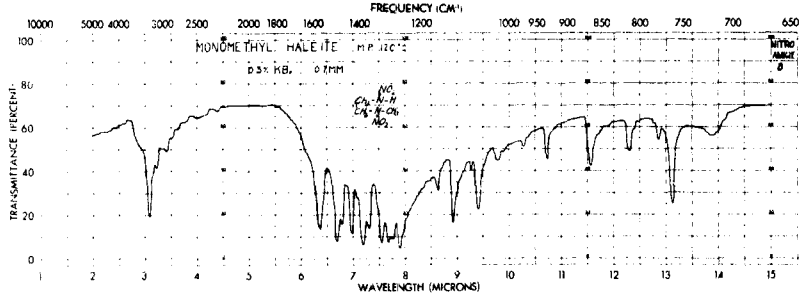

FREQUENCY (CM⁻¹)
1,3,5 TRIAZINE HEXAHYDRO 1,3,5-TRINITRO (RDX)
(CYCLONITE)
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

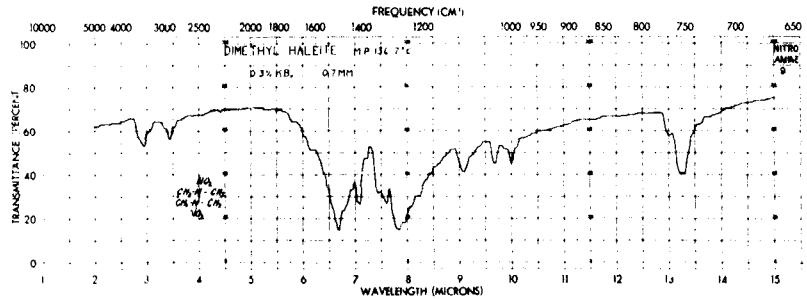

FREQUENCY (CM⁻¹)
CYCLOTETRAMETHYLENETETRANITRAMINE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

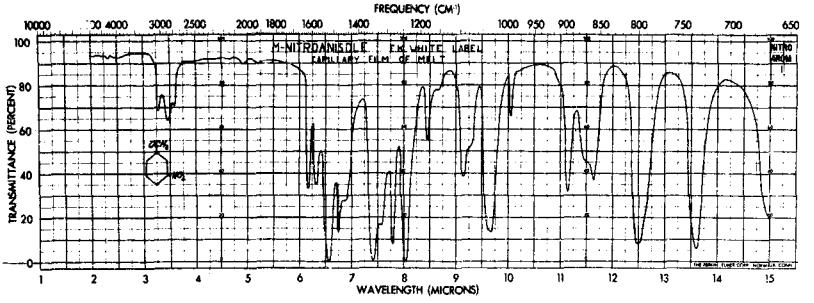

FREQUENCY (CM⁻¹)
CYCLOTETRAMETHYLENETETRANITRAMINE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

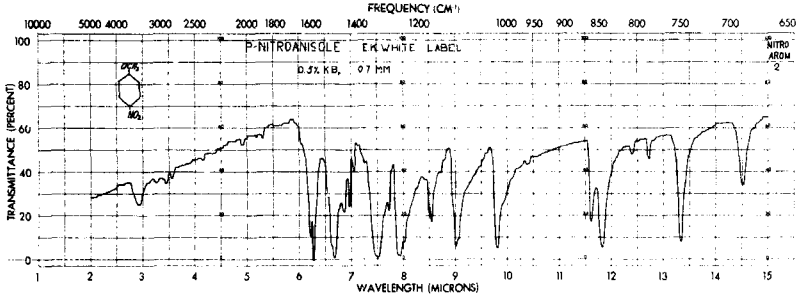

FREQUENCY (CM⁻¹)
(GAMMA HMX) M.PT. 274°C
CYCLOTETRAMETHYLENETETRANITRAMINE
0.4% KBr PLATE 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

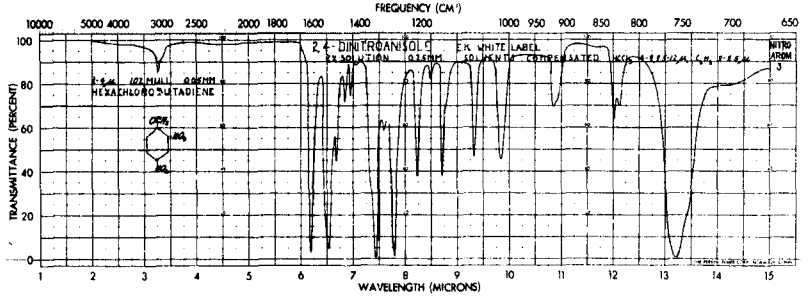

FREQUENCY (CM⁻¹)
(ETRYL) M.P. 130°C N-METHYL-N, 2,4,6-TETRANITROANILINE
MINERAL OIL
HEXACHLOROBUTADIENE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

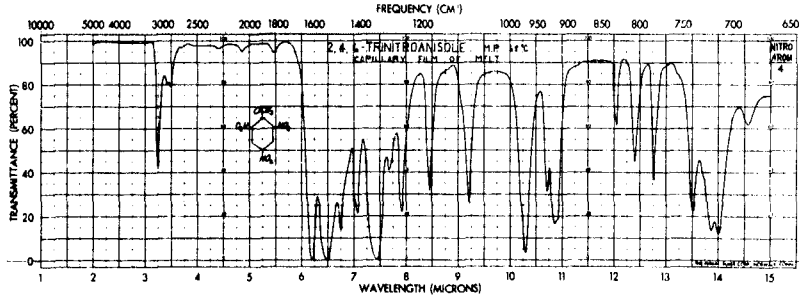

FREQUENCY (CM⁻¹)
MONOMETHYL HALEITE
0.3% KBr 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

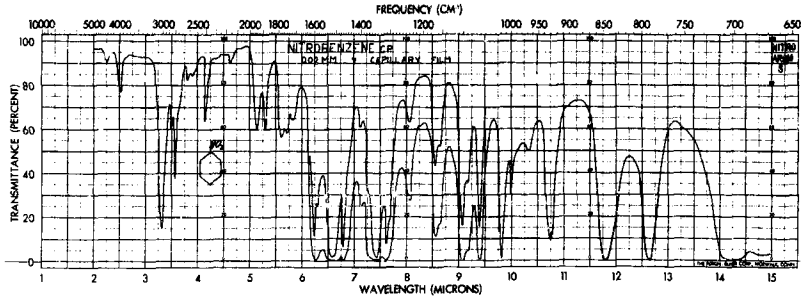

FREQUENCY (CM⁻¹)
DIMETHYL HALEITE
0.3% KBr 0.7MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

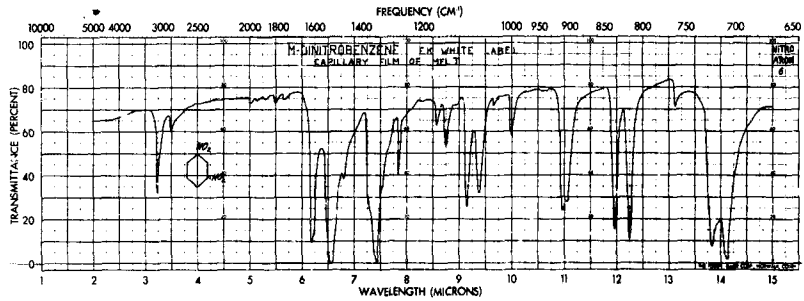

FREQUENCY (CM⁻¹)
10000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
M-NITROANISOLE E.K. WHITE LABEL
CAPILLARY FILM OF MELT
NITRO AROM. 1
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

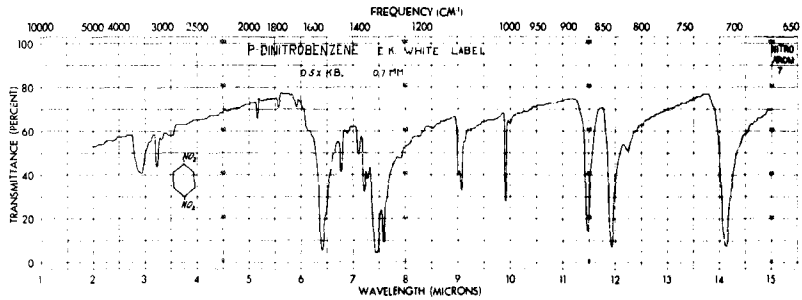

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
P-NITROANISOLE E.K. WHITE LABEL
NITRO AROM. 2
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

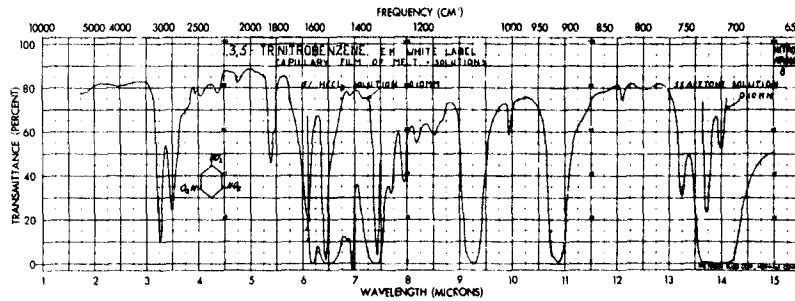

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,4-DINITROANISOLE E.K. WHITE LABEL
NITRO AROM. 3
HEXACHLOROBUTADIENE
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

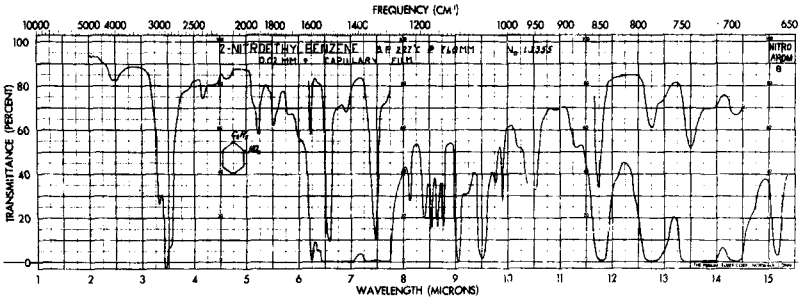

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,4,6-TRINITROANISOLE
CAPILLARY FILM OF MELT
NITRO AROM. 4
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

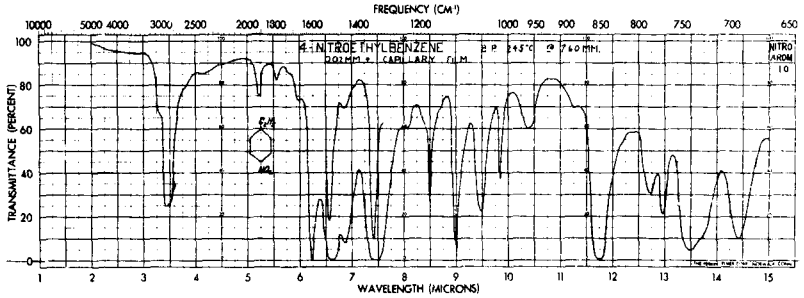

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
NITROBENZENE C.P.
0.08 MM. CAPILLARY FILM
NITRO AROM 3
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

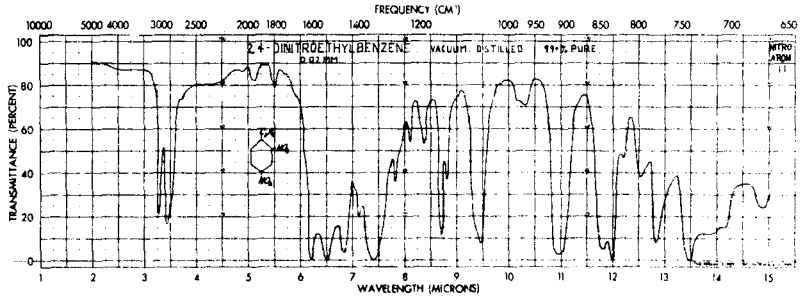

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
M-DINITROBENZENE E.K. WHITE LABEL
CAPILLARY FILM OF MELT
NITRO AROM 6
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

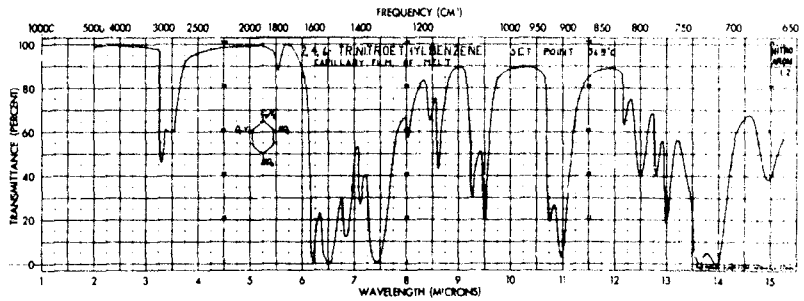

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
P-DINITROBENZENE E.K. WHITE LABEL
0.5% KB. 0.7 MM
NITRO AROM 7
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

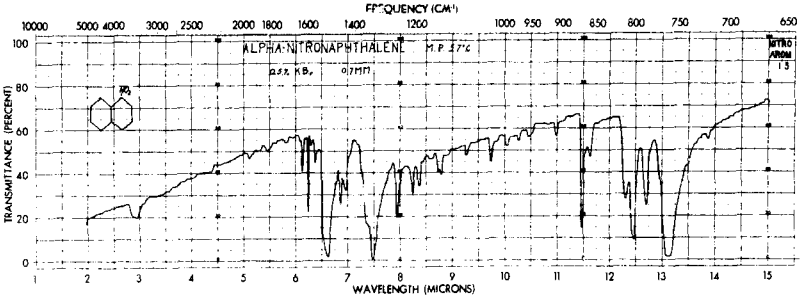

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
1,3,5 TRINITROBENZENE E.K. WHITE LABEL
CAPILLARY FILM OF MELT + SOLUTIONS
NITRO AROM 8
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

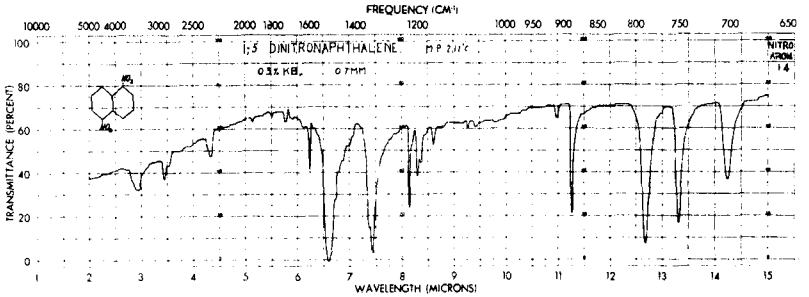

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2-NITROETHYLBENZENE
0.02 MM. • CAPILLARY FILM
NITRO AROM 8
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

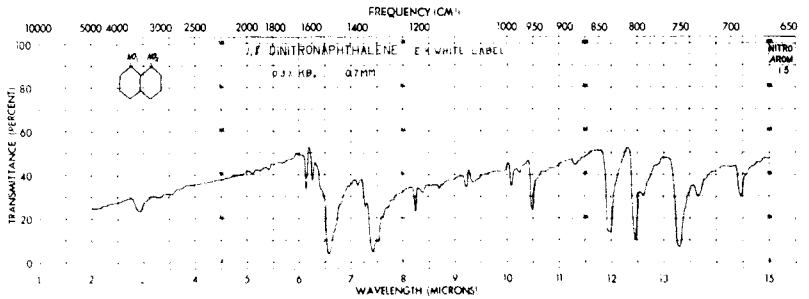

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
4-NITROETHYLBENZENE
0.02 MM. • CAPILLARY FILM
NITRO AROM 10
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

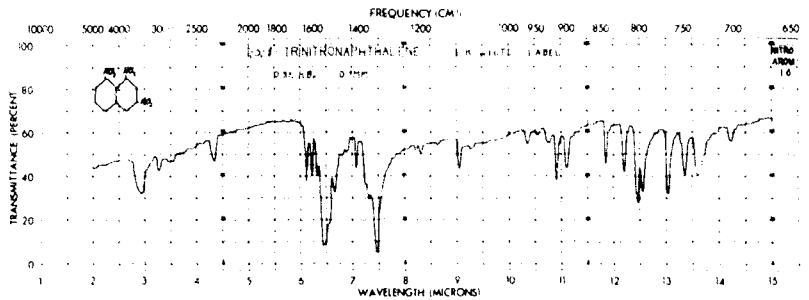

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,4-DINITROETHYLBENZENE
0.02 MM.
NITRO AROM 11
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

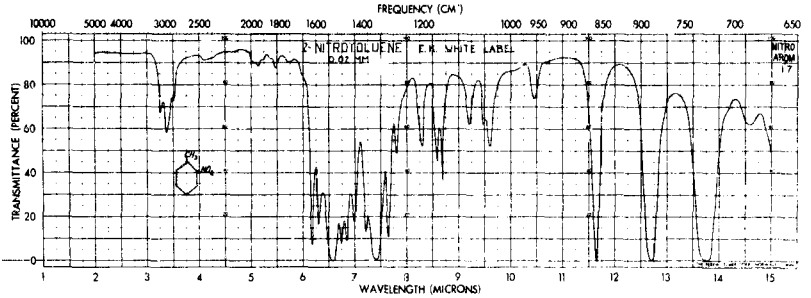

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,4,6-TRINITROETHYLBENZENE
CAPILLARY FILM OF MELT
NITRO AROM 12
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

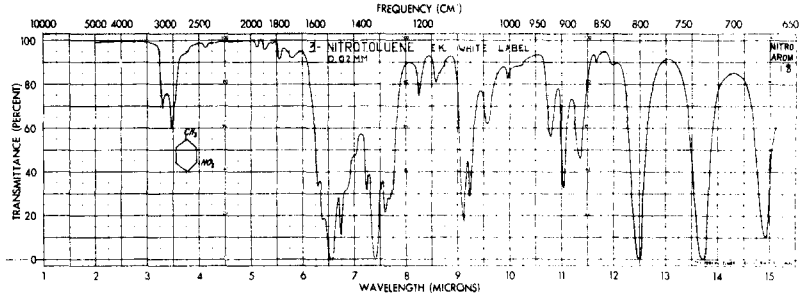

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
ALPHA-NITRONAPHTHALENE M.P. 57°C
0.5% KBr, 0.7MM
NITRO AROM. 13
TRANSMITTANCE (PERCENT)
0 20 40 60 80 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

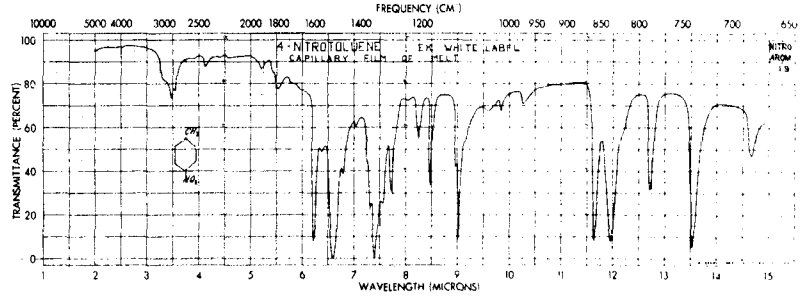

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
1,5 DINITRONAPHTHALENE M.P. 216°C
0.5% KBr, 0.7MM
NITRO AROM. 14
TRANSMITTANCE (PERCENT)
0 20 40 60 80 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

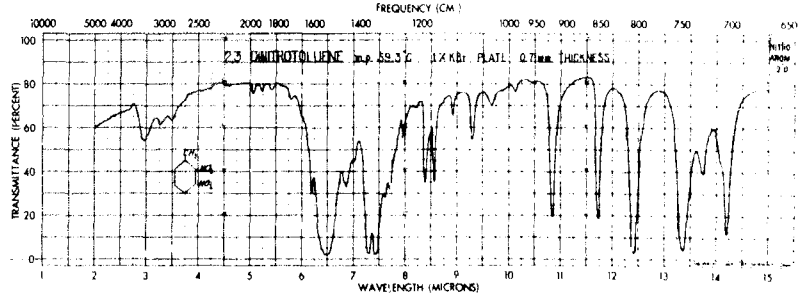

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,7 DINITRONAPHTHALENE EASTMAN WHITE LABEL
0.5% KBr, 0.7MM
NITRO AROM. 15
TRANSMITTANCE (PERCENT)
0 20 40 60 80 100
1 2 4 5 6 7 8 9 10 11 12 13 15
WAVELENGTH (MICRONS)

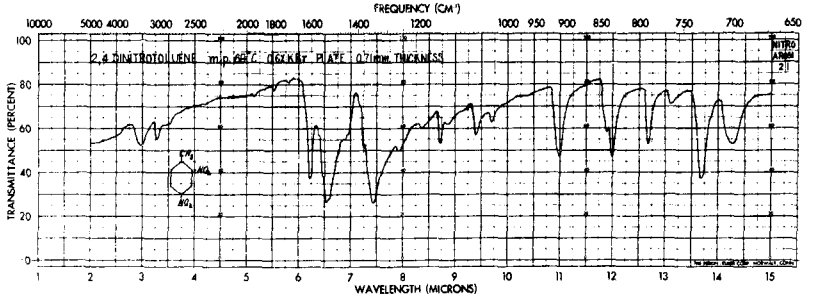

FREQUENCY (CM⁻¹)
10000 5000 4000 30 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,4,7 TRINITRONAPHTHALENE EASTMAN WHITE LABEL
0.5% KBr, 0.7MM
NITRO AROM. 16
TRANSMITTANCE (PERCENT)
0 20 40 60 80 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

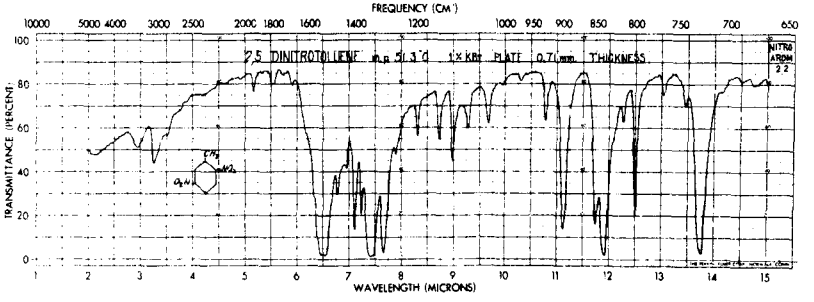

FREQUENCY (CM⁻¹)
2-NITROTOLUENE E.K. WHITE LABEL
0.02 MM
NITRO AROM 17
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

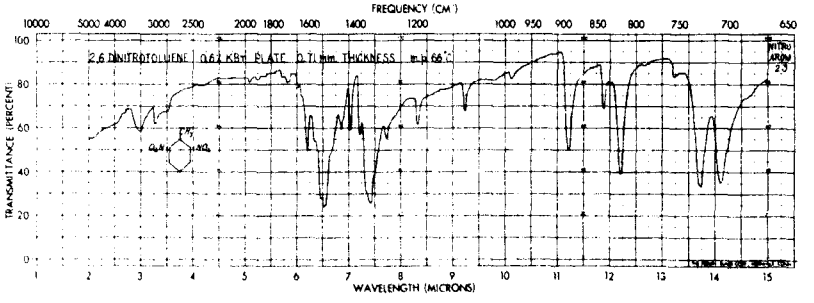

FREQUENCY (CM⁻¹)
3-NITROTOLUENE E.K. WHITE LABEL
0.02 MM
NITRO AROM 18
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

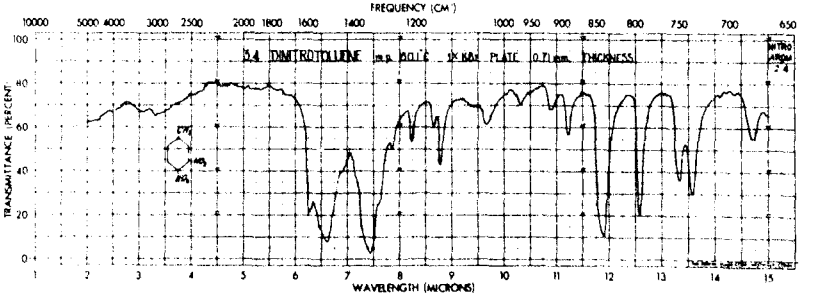

FREQUENCY (CM⁻¹)
4-NITROTOLUENE E.K. WHITE LABEL
CAPILLARY FILM OF MELT
NITRO AROM 19
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

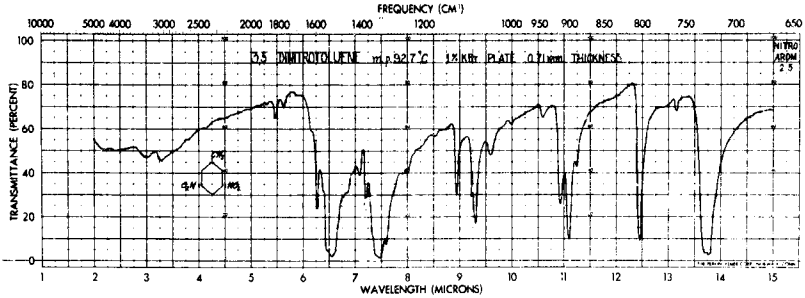

FREQUENCY (CM⁻¹)
2,3 DINITROTOLUENE m.p. 59.3°C 1% KBr PLATE 0.7mm THICKNESS
NITRO AROM 20
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

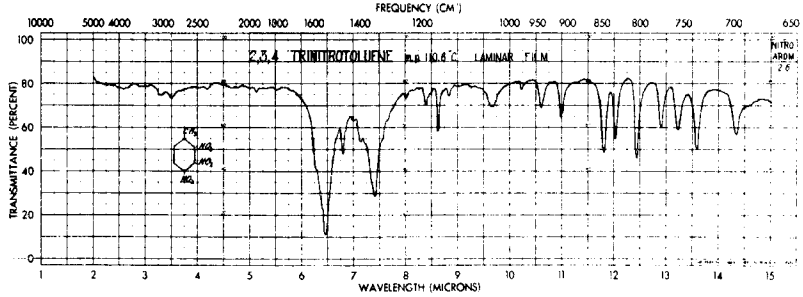

FREQUENCY (CM⁻¹)
2,4 DINITROTOLUENE m.p. 68°C 0.5% KBr PLATE 0.7mm THICKNESS
NITRO AROM 2.1
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

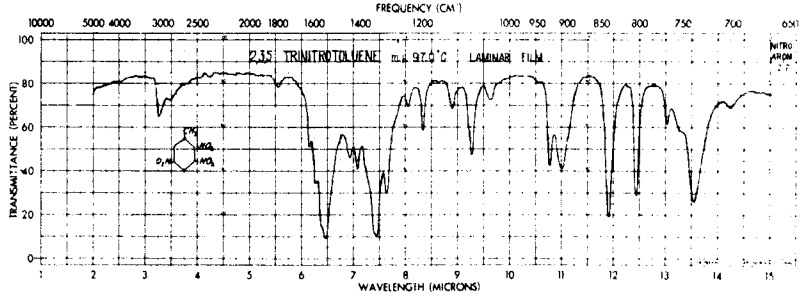

FREQUENCY (CM⁻¹)
2,5 DINITROTOLUENE m.p. 51.3°C 1% KBr PLATE 0.7mm THICKNESS
NITRO AROM 2.2
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

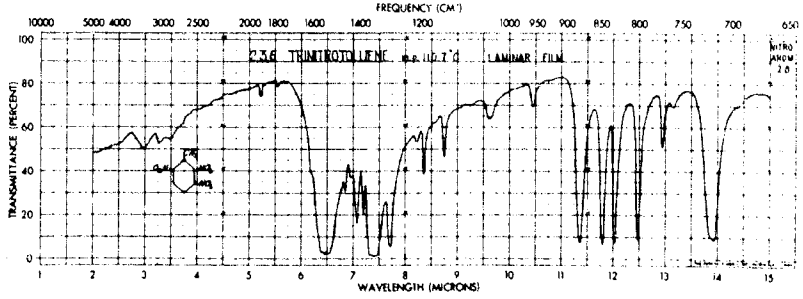

FREQUENCY (CM⁻¹)
2,6 DINITROTOLUENE 0.5% KBr PLATE 0.7mm THICKNESS m.p. 66°C
NITRO AROM 2.3
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

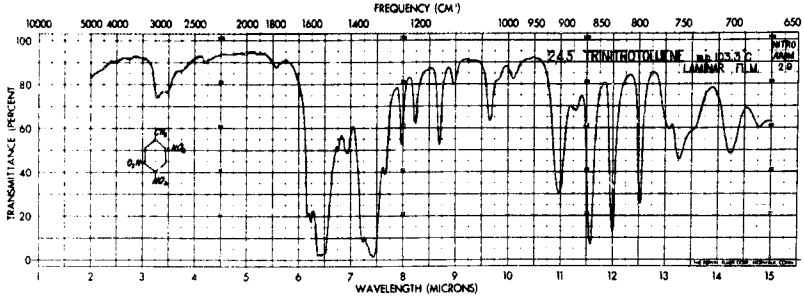

FREQUENCY (CM⁻¹)
3,4 DINITROTOLUENE m.p. 40.1°C 1% KBr PLATE 0.7mm THICKNESS
NITRO AROM 2.4
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

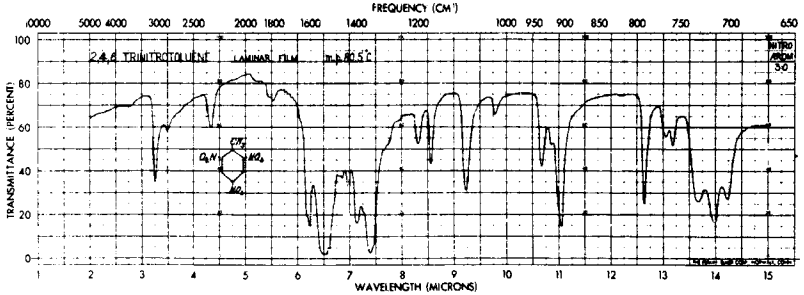

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,5 DINITROTOLUENE m.p 92.7°C 1% KBr PLATE 0.7 mm. THICKNESS
NITRO AROM 2.5
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

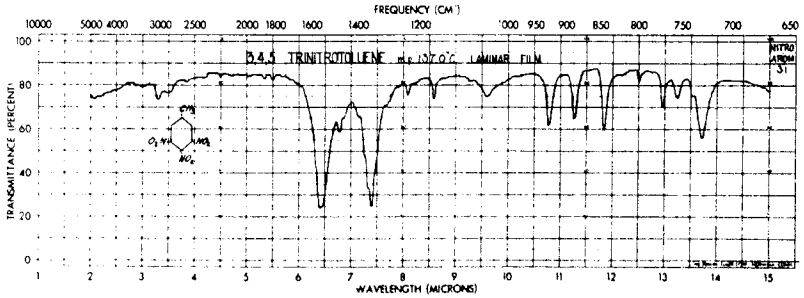

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,3,4 TRINITROTOLUENE m.p 110.6°C LAMINAR FILM
NITRO AROM 2.6
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

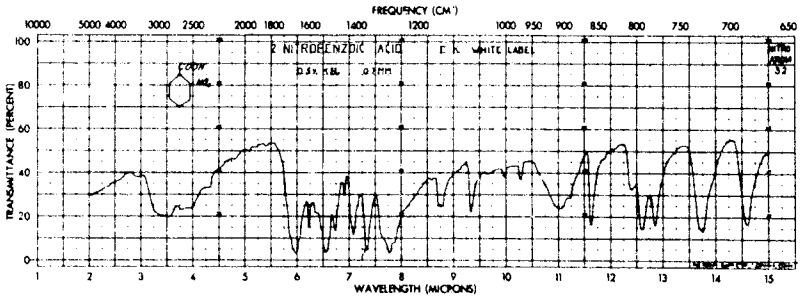

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,3,5 TRINITROTOLUENE m.p 97.0°C LAMINAR FILM
NITRO AROM 2.7
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

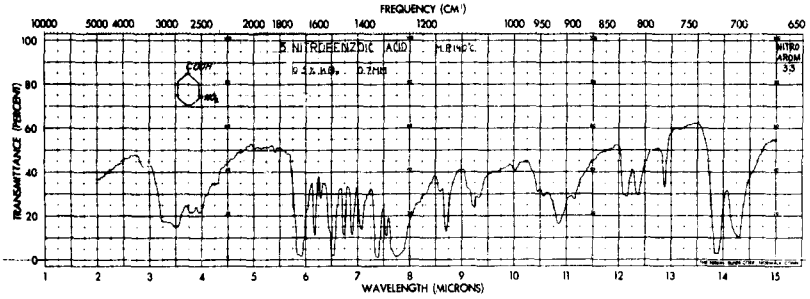

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,3,6 TRINITROTOLUENE m.p 110.7°C LAMINAR FILM
NITRO AROM 2.8
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

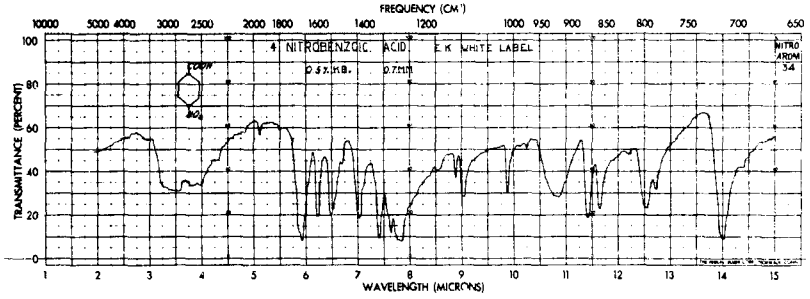

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,6,5 TRINITROTOLUENE m.p. 103.5°C
LAMINAR FILM
NITRO AROM 2.9
TRANSMITTANCE (PERCENT)
0 20 40 60 80 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

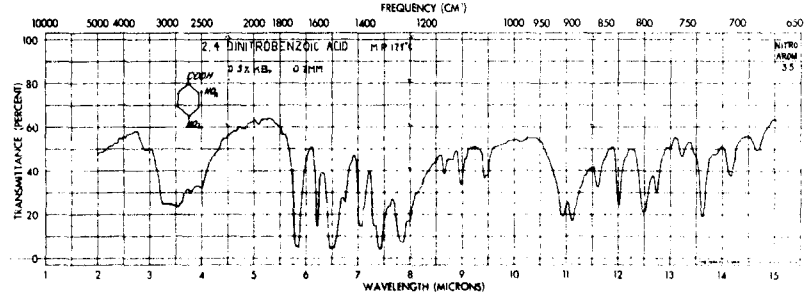

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,4,6 TRINITROTOLUENE LAMINAR FILM m.p. 80.5°C
NITRO AROM 5.0
TRANSMITTANCE (PERCENT)
0 20 40 60 80 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

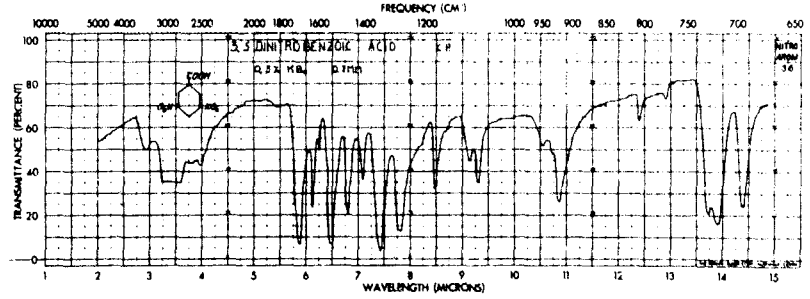

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,4,5 TRINITROTOLUENE m.p. 107.0°C LAMINAR FILM
NITRO AROM 3.1
TRANSMITTANCE (PERCENT)
0 20 40 60 80 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

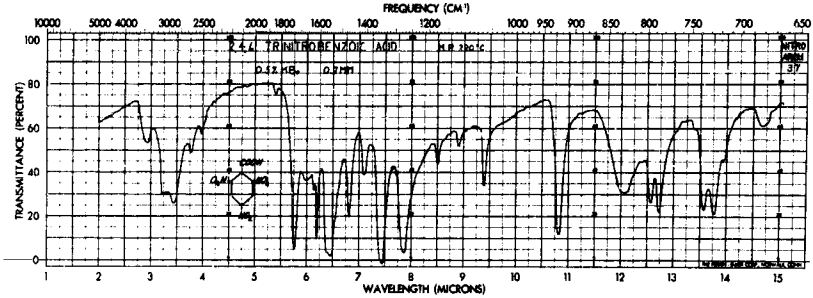

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2 NITROBENZOIC ACID E.K. WHITE LABEL
NITRO AROM 5.2
TRANSMITTANCE (PERCENT)
0 20 40 60 80 100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

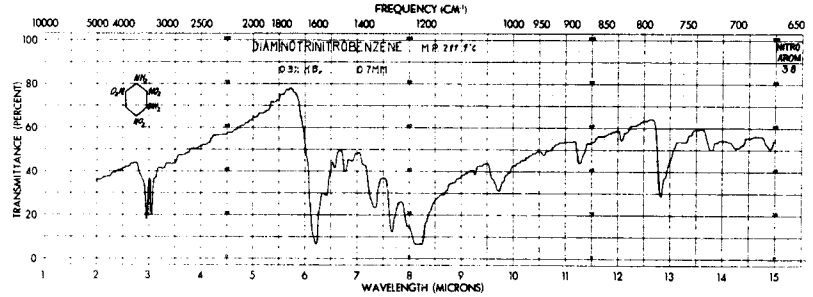

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
3 NITROBENZOIC ACID
0.5% KBr, 0.7mm
NITRO AROM 33
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

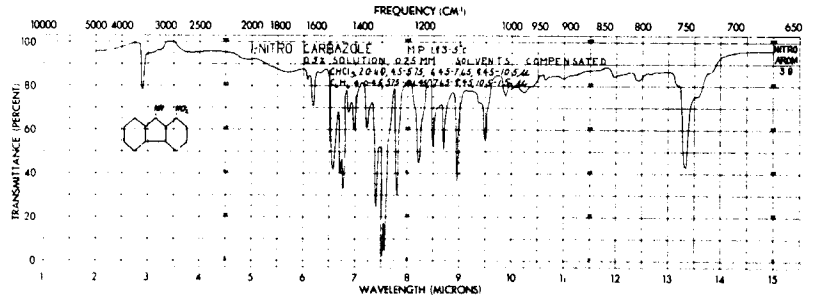

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
4 NITROBENZOIC ACID E K WHITE LABEL
0.5% KBr, 0.7mm
NITRO AROM 34
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

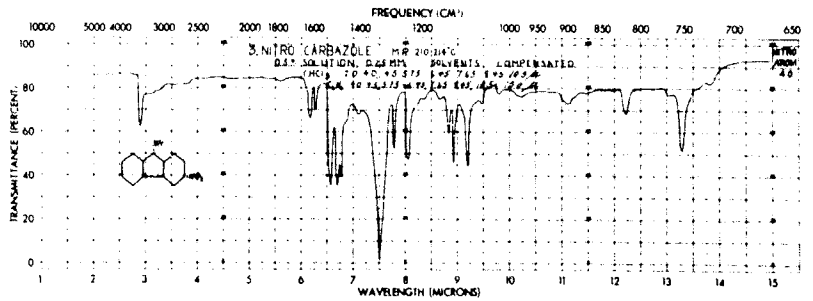

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
2,4 DINITROBENZOIC ACID
0.5% KBr, 0.7mm
NITRO AROM 35
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

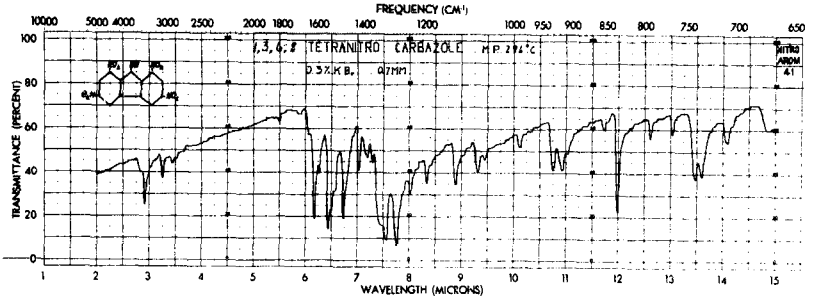

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
3,5 DINITROBENZOIC ACID
0.5% KBr, 0.7mm
NITRO AROM 36
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

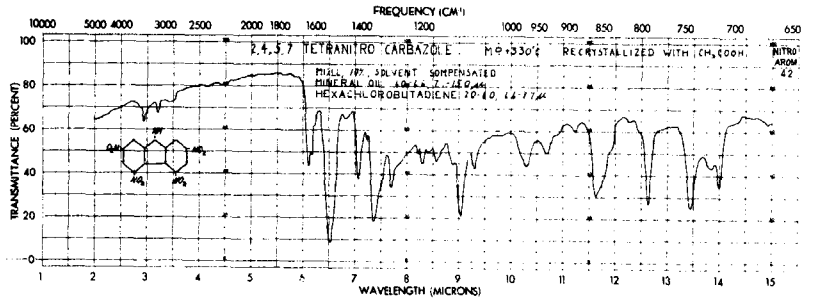

FREQUENCY (CM⁻¹)
2,4,6 TRINITROBENZOIC ACID
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

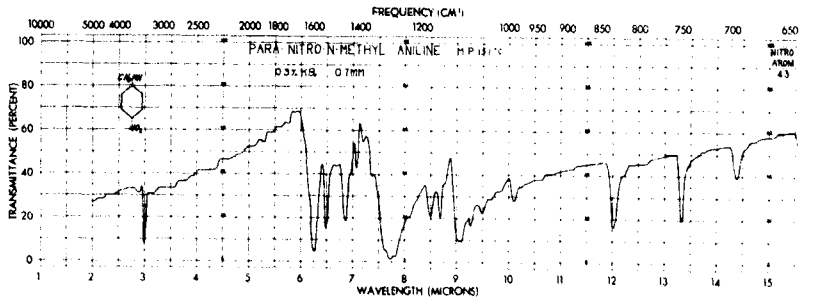

FREQUENCY (CM⁻¹)
DIAMINOTRINITROBENZENE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

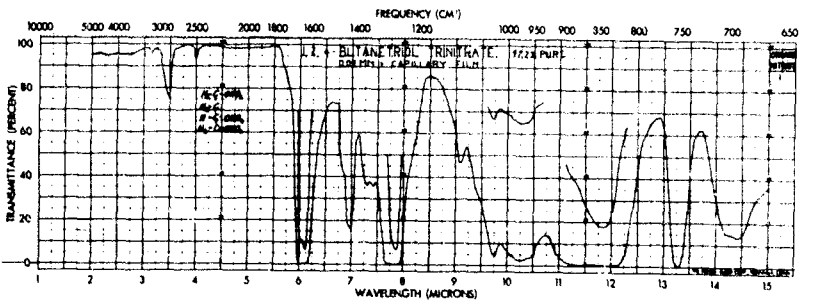

FREQUENCY (CM⁻¹)
1-NITRO CARBAZOLE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

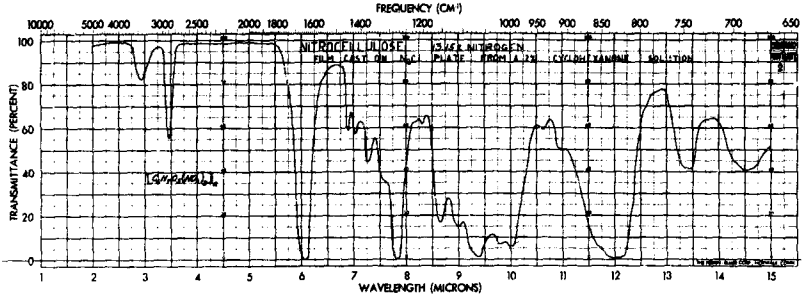

FREQUENCY (CM⁻¹)
3-NITRO CARBAZOLE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

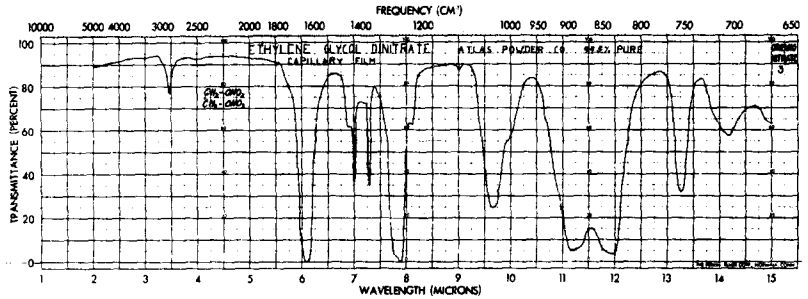

FREQUENCY (CM⁻¹)
1,3,4,8 TETRANITRO CARBAZOLE M.P. 296°C
0.5% KBr 0.7MM
NITRO AROM 41
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

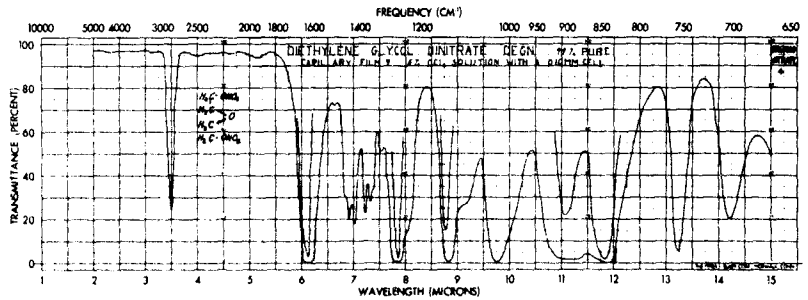

FREQUENCY (CM⁻¹)
2,4,5,7 TETRANITRO CARBAZOLE M.P. +330°C RECRYSTALLIZED WITH CH₃COOH.
MULL TYP. SOLVENT COMPENSATED
MINERAL OIL
HEXACHLOROBUTADIENE
NITRO AROM 42
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

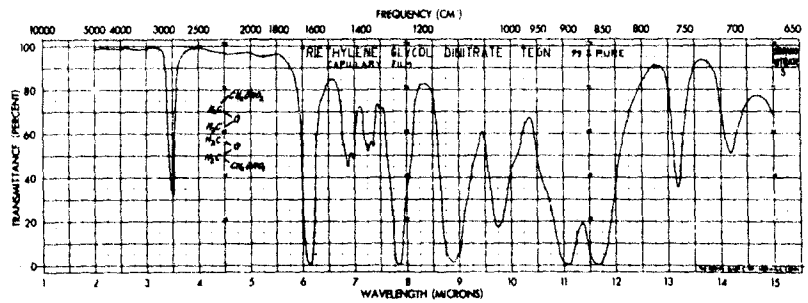

FREQUENCY (CM⁻¹)
PARA NITRO N-METHYL ANILINE M.P. 151°C
0.5% KBr 0.7MM
NITRO AROM 43
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

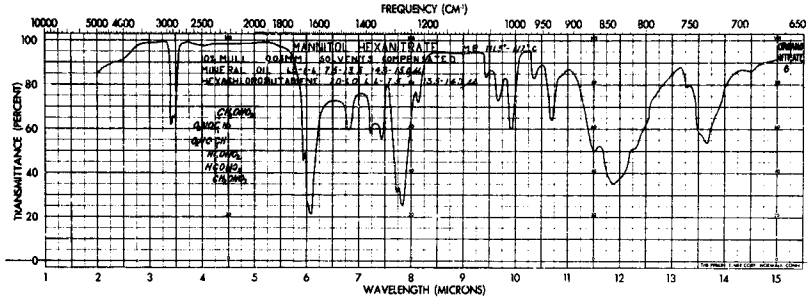

FREQUENCY (CM⁻¹)
1,2,4 BUTANETRIOL TRINITRATE 97.2% PURE
BETWEEN CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

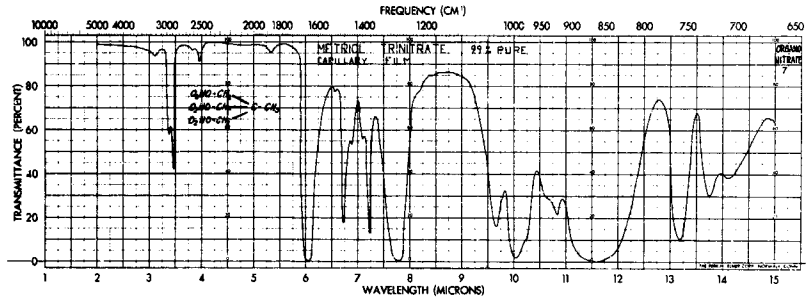

FREQUENCY (CM⁻¹)
NITROCELLULOSE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

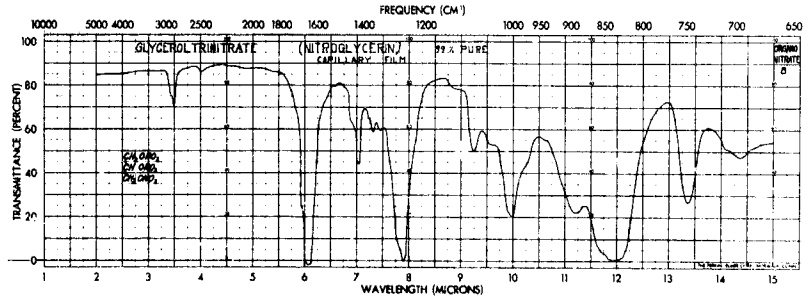

FREQUENCY (CM⁻¹)
ETHYLENE GLYCOL DINITRATE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

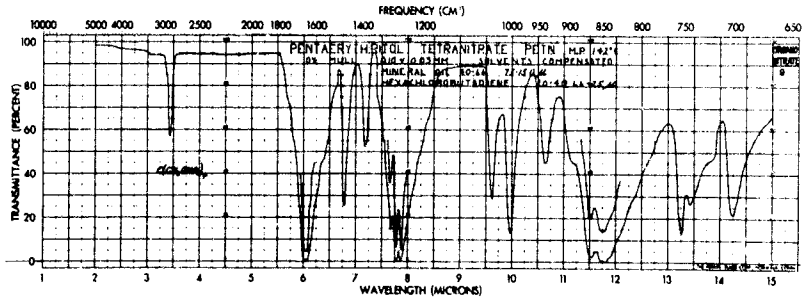

FREQUENCY (CM⁻¹)
DIETHYLENE GLYCOL DINITRATE DEGN
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

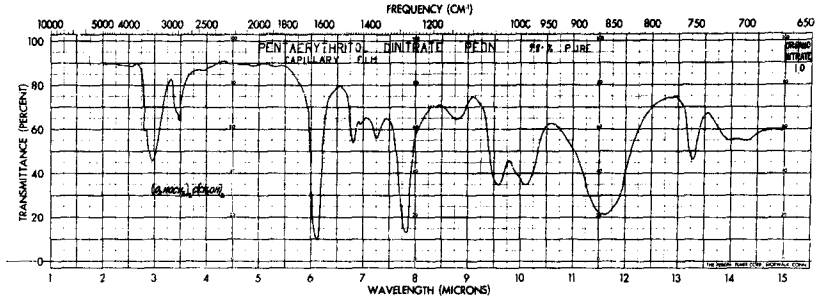

FREQUENCY (CM⁻¹)
TRIETHYLENE GLYCOL DINITRATE TEGN
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

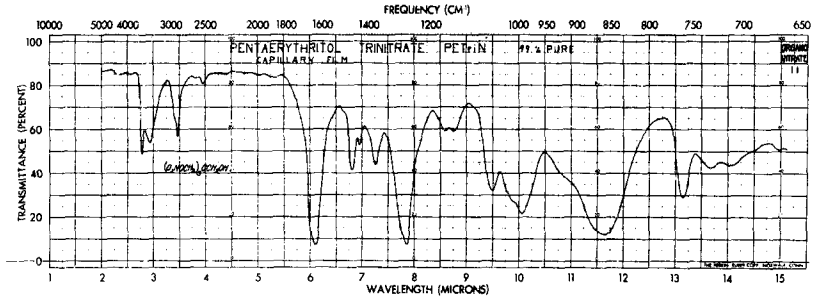

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
MANNITOL HEXANITRATE
5% MULL
0.08 MM SOLVENTS COMPENSATED
MINERAL OIL
HEXACHLOROBUTADIENE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

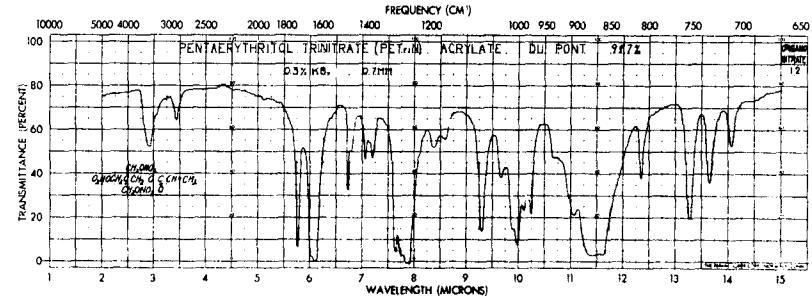

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
METHYL TRINITRATE
99.2 % PURE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

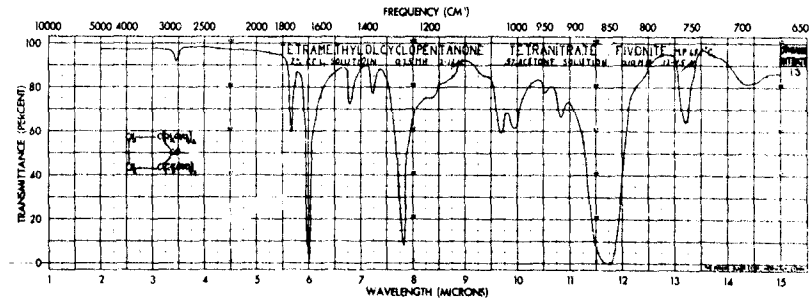

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
GLYCEROL TRINITRATE (NITROGLYCERIN)
99 % PURE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

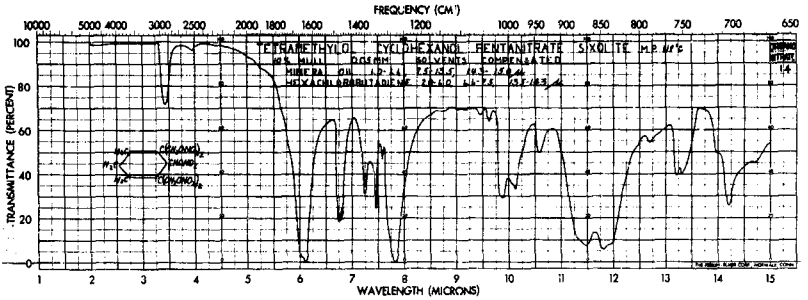

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
PENTAERYTHRITOL TETRANITRATE PETN
5% MULL
0.08 MM SOLVENTS COMPENSATED
MINERAL OIL
HEXACHLOROBUTADIENE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

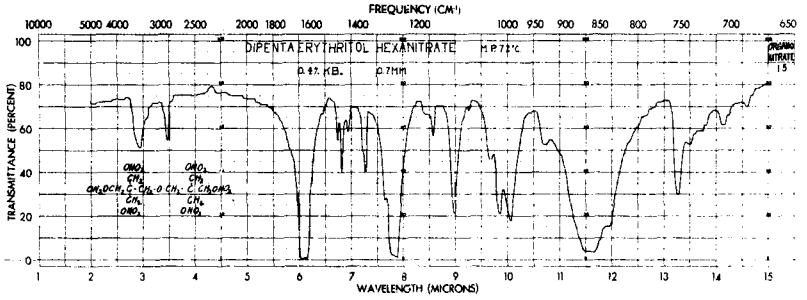

FREQUENCY (CM⁻¹)
PENTAERYTHRITOL DINITRATE PEDN 99+% PURE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

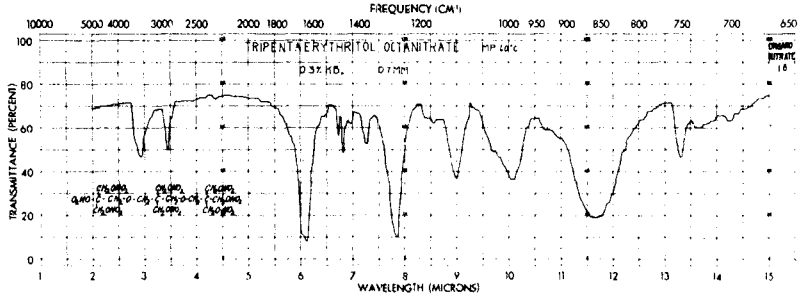

FREQUENCY (CM⁻¹)
PENTAERYTHRITOL TRINITRATE PETriN 99.4 PURE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

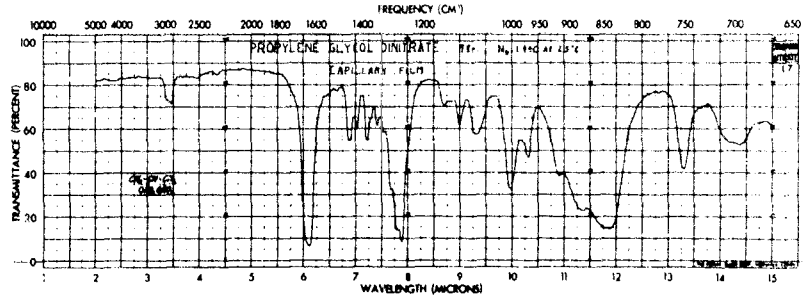

FREQUENCY (CM⁻¹)
PENTAERYTHRITOL TRINITRATE (PETriN) ACRYLATE DU PONT 98.7%
0.3% KB, 0.2MM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

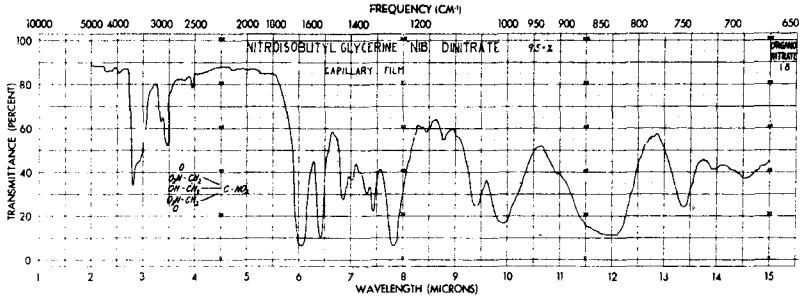

FREQUENCY (CM⁻¹)
TETRAMETHYLOLCYCLOPENTANONE TETRANITRATE PIVONITE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

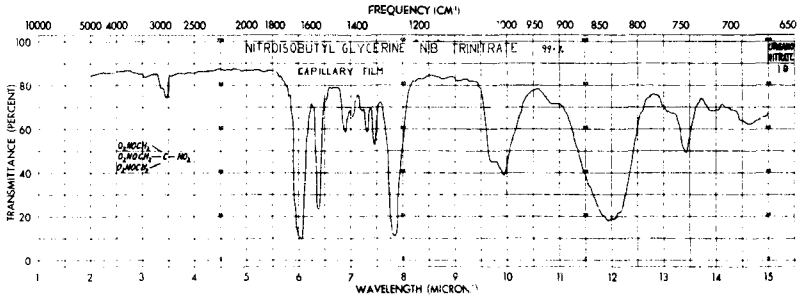

FREQUENCY (CM⁻¹)
TETRAMETHYLOL CYCLOHEXANOL PENTANITRATE SIXOLITE M.P. 46°C
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

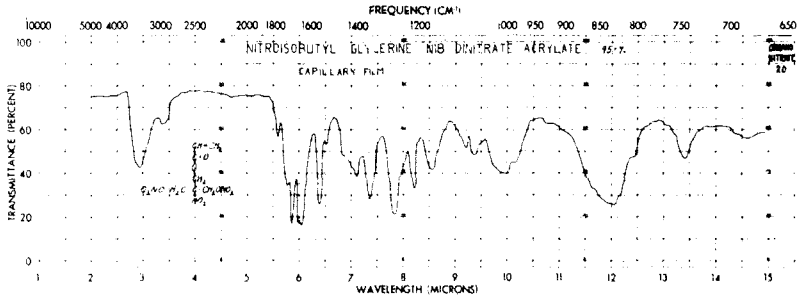

FREQUENCY (CM⁻¹)
DIPENTAERYTHRITOL HEXANITRATE M.P. 72°C
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

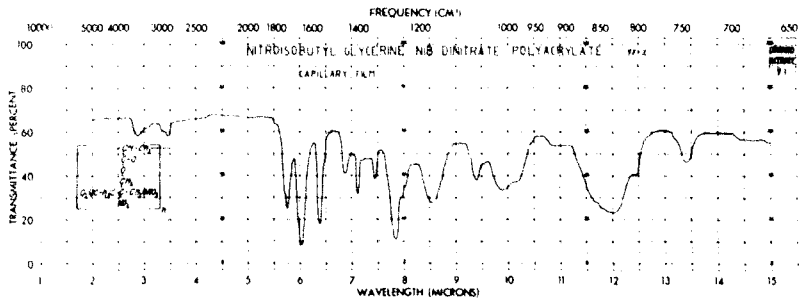

FREQUENCY (CM⁻¹)
TRIPENTAERYTHRITOL OCTANITRATE
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

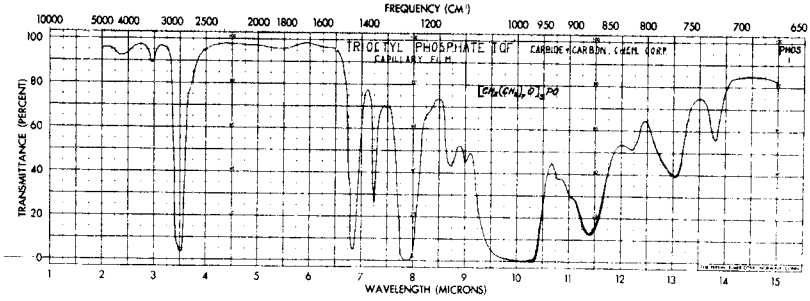

FREQUENCY (CM⁻¹)
PROPYLENE GLYCOL DINITRATE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

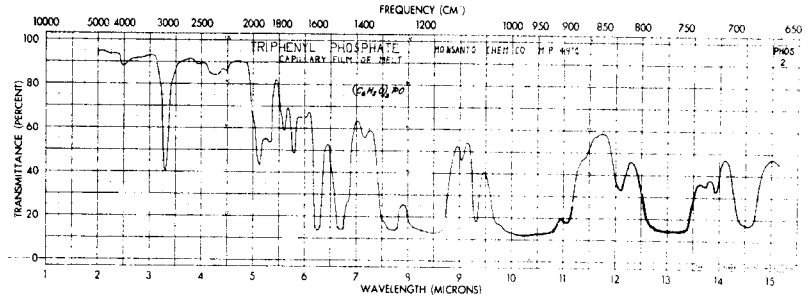

FREQUENCY (CM-1)
NITRODISOBUTYL GLYCERINE NIB DINITRATE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

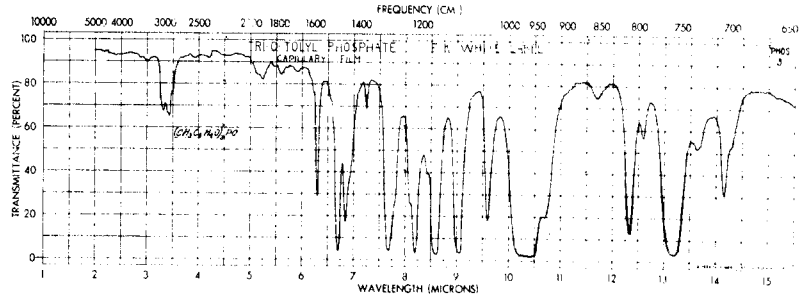

FREQUENCY (CM-1)
NITRODISOBUTYL GLYCERINE NIB TRINITRATE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

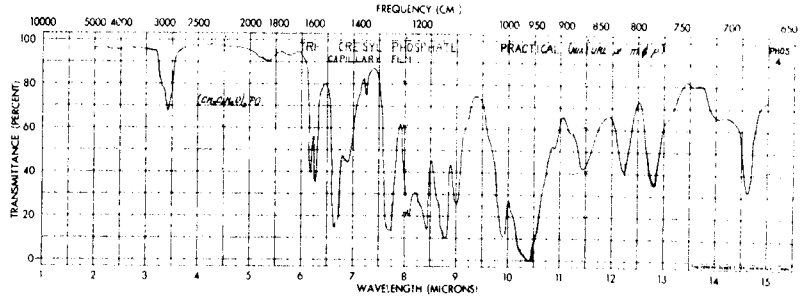

FREQUENCY (CM-1)
NITRODISOBUTYL GLYCERINE NIB DINITRATE ACRYLATE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

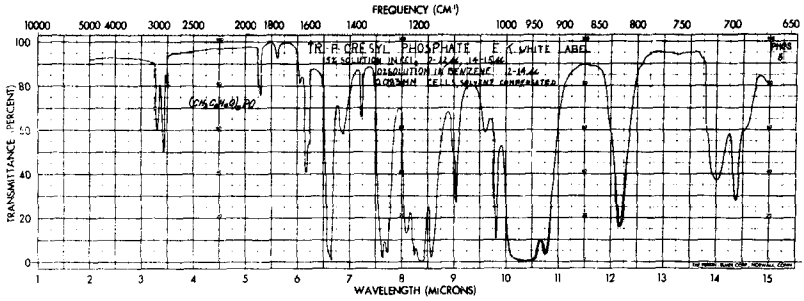

FREQUENCY (CM-1)
NITRODISOBUTYL GLYCERINE NIB DINITRATE POLYACRYLATE
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

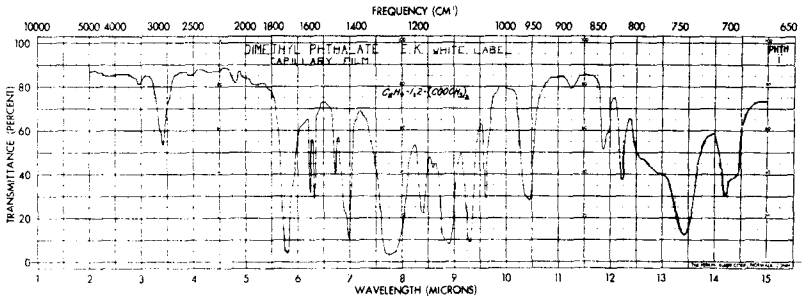

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRIOCTYL PHOSPHATE (OF CARBIDE + CARBON CHEM. CORP.
CAPILLARY FILM
PHOS
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

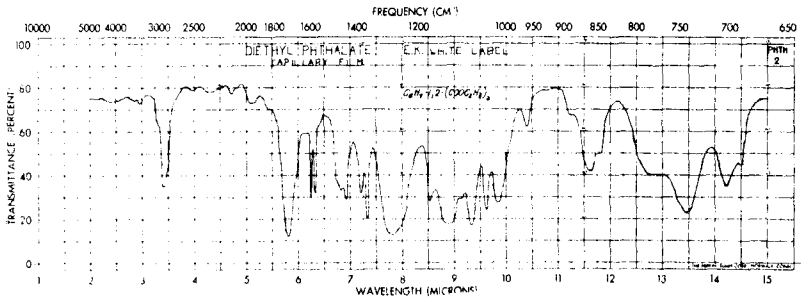

FREQUENCY (CM)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRIPHENYL PHOSPHATE
CAPILLARY FILM OF MELT
MONSANTO CHEMICO M.P. 49°C
PHOS 2
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

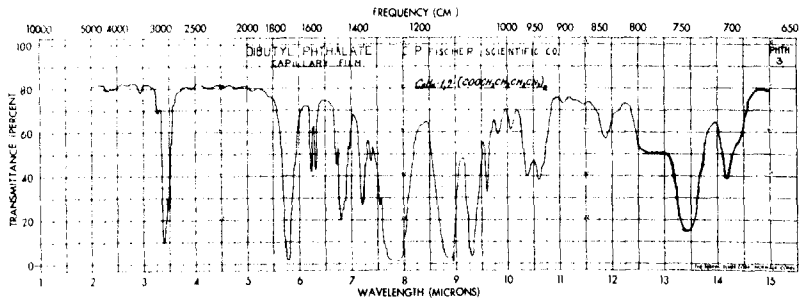

FREQUENCY (CM)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRIOCTYL PHOSPHATE F.R. WHITE
CAPILLARY FILM
PHOS 3
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

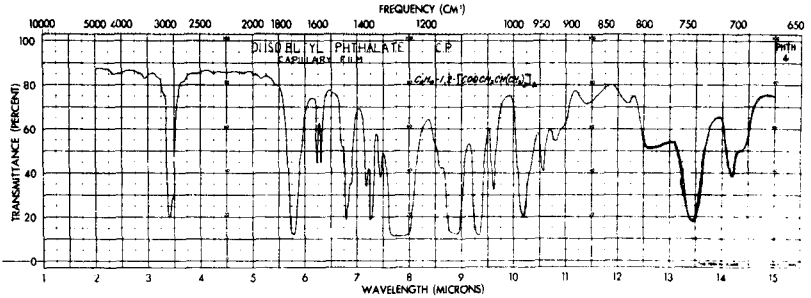

FREQUENCY (CM)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRICRESYL PHOSPHATE
CAPILLARY FILM
PRACTICAL
PHOS 4
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

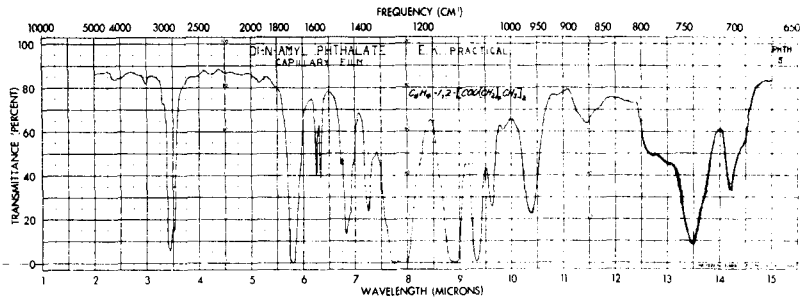

FREQUENCY (CM⁻¹)
TRI-P-CRESYL PHOSPHATE E.K. WHITE LABEL
5% SOLUTION IN CCl4 2-12 μ, 14-15 μ
DISSOLUTION IN BENZENE 12-14 μ
0.05MM CELL, SOLVENT CONDENSATED
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

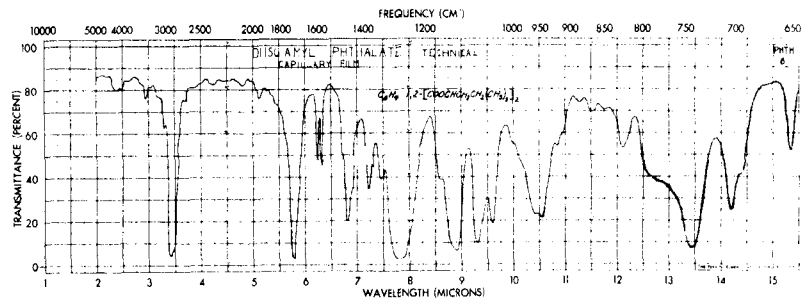

FREQUENCY (CM⁻¹)
DIMETHYL PHTHALATE E.K. WHITE LABEL
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

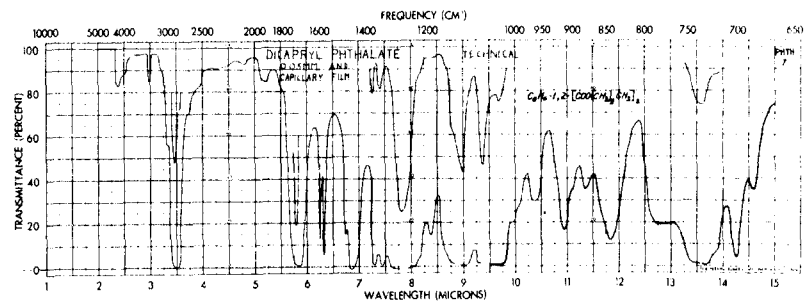

FREQUENCY (CM⁻¹)
DIETHYL PHTHALATE E.K. WHITE LABEL
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

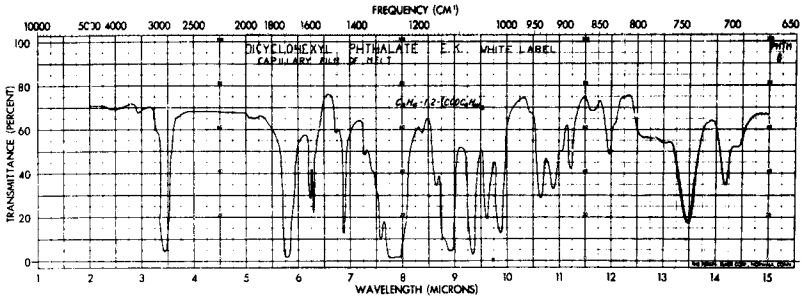

FREQUENCY (CM⁻¹)
DIBUTYL PHTHALATE E.P. FISCHER SCIENTIFIC CO.
CAPILLARY FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

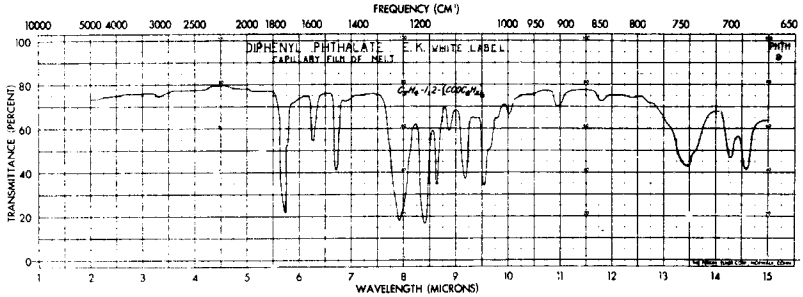

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DIISOBUTYL PHTHALATE C.P.
CAPILLARY FILM
PHTH 6
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

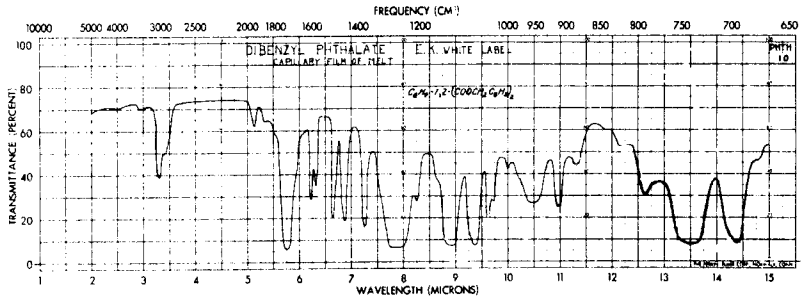

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DI-N-AMYL PHTHALATE E.K. PRACTICAL
CAPILLARY FILM
PHTH 5
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

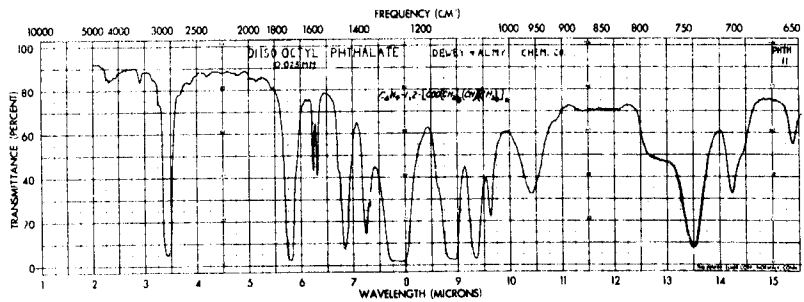

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DIISOAMYL PHTHALATE TECHNICAL
CAPILLARY FILM
PHTH 6
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

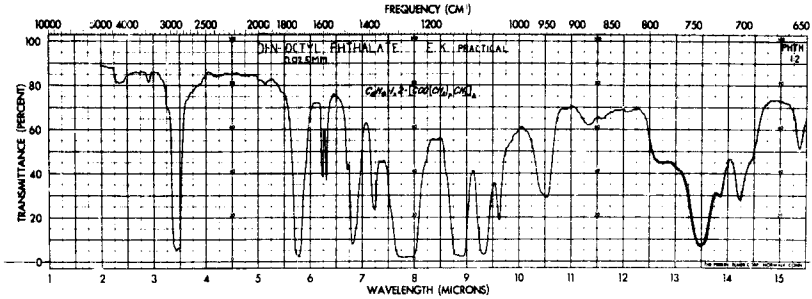

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DIAMYL PHTHALATE TECHNICAL
DIMMITT AND
CAPILLARY FILM
PHTH 7
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

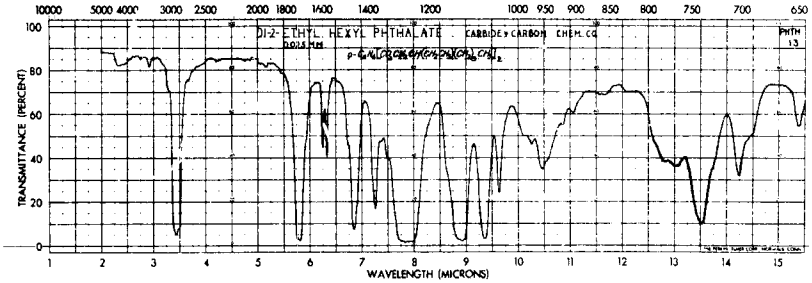

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DICYCLOHEXYL PHTHALATE E.K. WHITE LABEL
CAPILLARY FILM OF MELT
PHTH 6
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

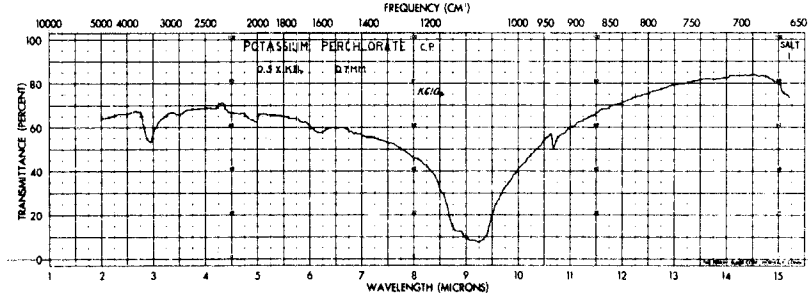

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DIPHENYL PHTHALATE E.K. WHITE LABEL
CAPILLARY FILM OF MELT
PHTH 9
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

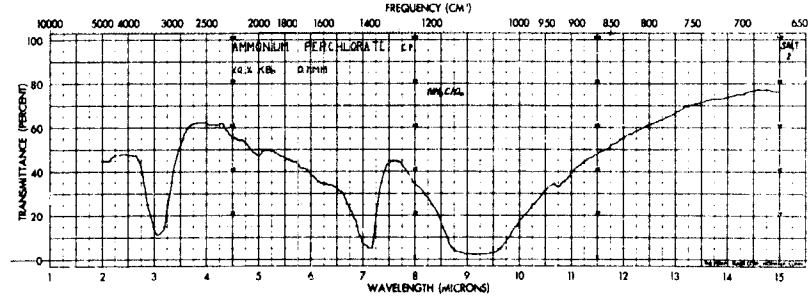

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DIBENZYL PHTHALATE E.K. WHITE LABEL
CAPILLARY FILM OF MELT
PHTH 10
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

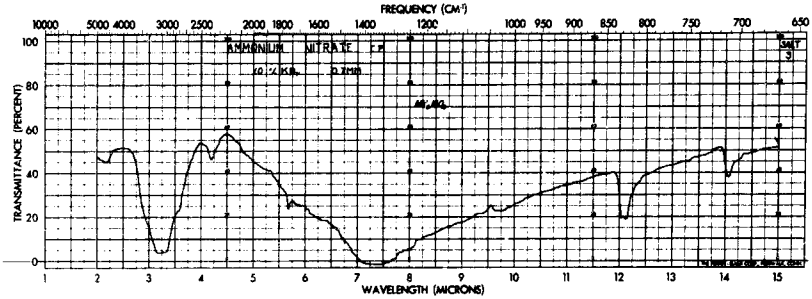

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
DIISO OCTYL PHTHALATE DEWEY & ALMY CHEM. CO.
PHTH 11
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

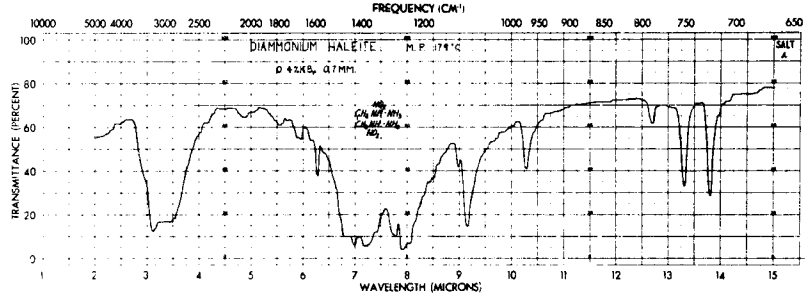

FREQUENCY (CM⁻¹)
DI-N-OCTYL PHTHALATE E. K. PRACTICAL
0.075 MM
PHTH 12
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

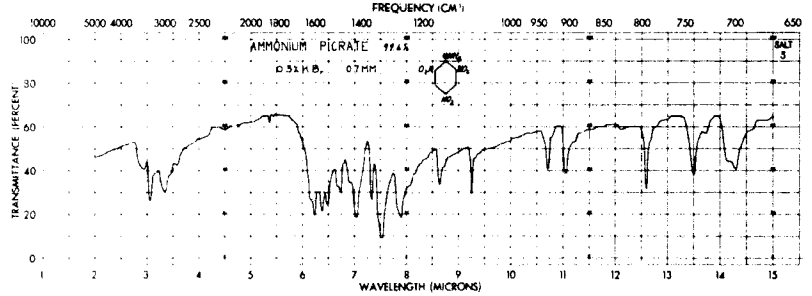

FREQUENCY (CM⁻¹)
DI-2-ETHYL HEXYL PHTHALATE CARBIDE & CARBON CHEM. CO
0.015 MM
PHTH 13
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

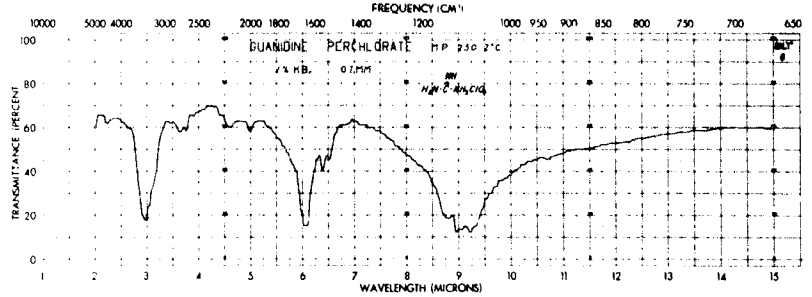

FREQUENCY (CM⁻¹)
POTASSIUM PERCHLORATE C.P
0.3 % KBr, 0.7 MM
SALT 1
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

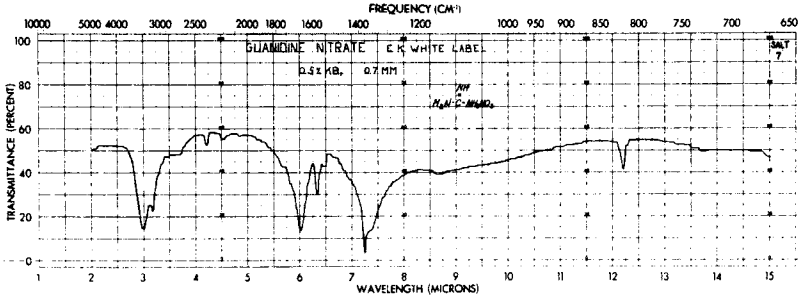

FREQUENCY (CM⁻¹)
AMMONIUM PERCHLORATE C.P
0.3 % KBr, 0.7 MM
SALT 2
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

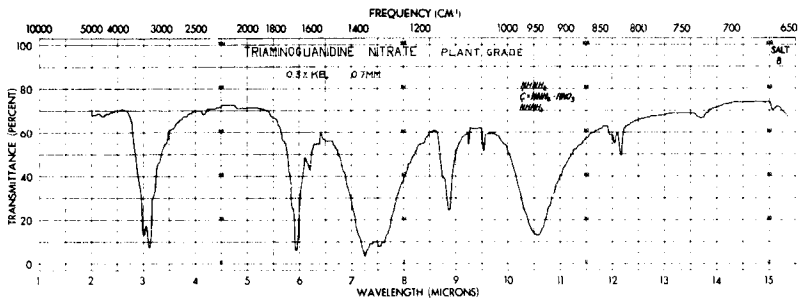

FREQUENCY (CM⁻¹)
AMMONIUM NITRATE
SALT 3
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

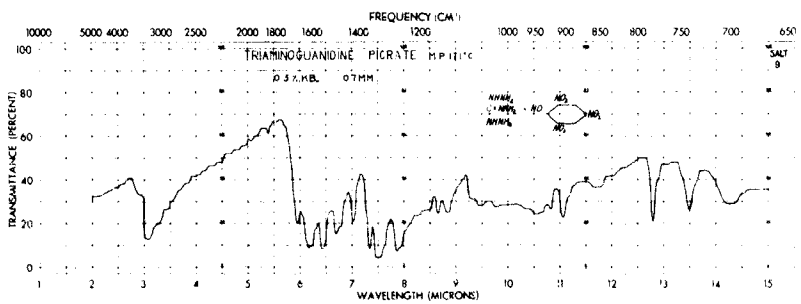

FREQUENCY (CM⁻¹)
DIAMMONIUM HALEITE
SALT 4
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

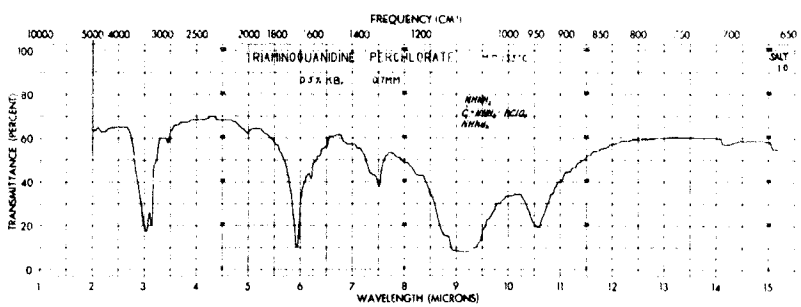

FREQUENCY (CM⁻¹)
AMMONIUM PICRATE
SALT 5
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

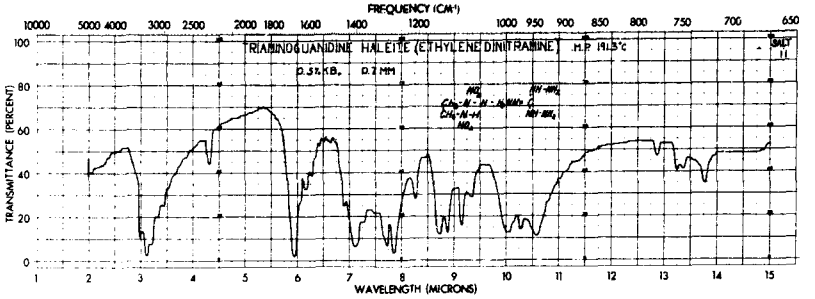

FREQUENCY (CM⁻¹)
GUANIDINE PERCHLORATE
SALT 6
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

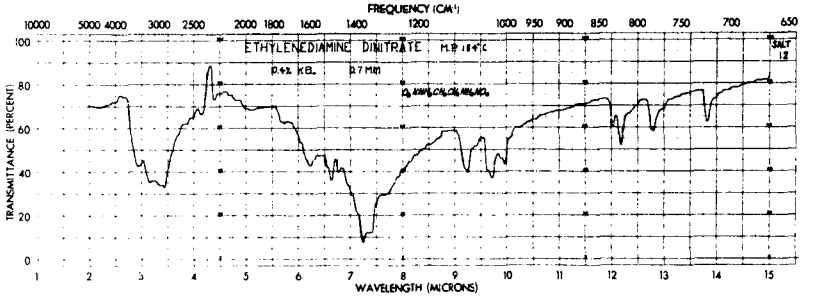

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
GUANIDINE NITRATE E.K. WHITE LABEL
0.5% KB. 0.7 MM
SALT 7
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

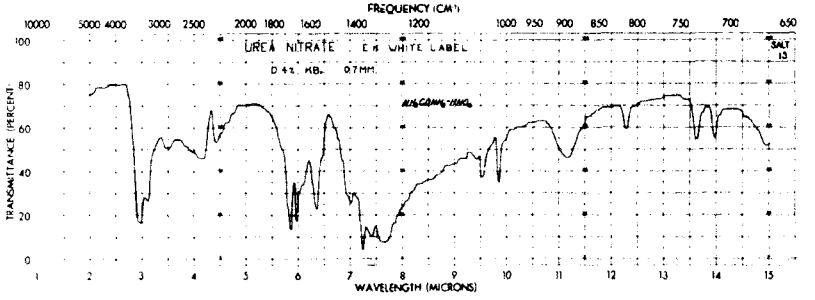

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRIAMINOGUANIDINE NITRATE PLANT GRADE
0.5% KB. 0.7MM
SALT 8
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

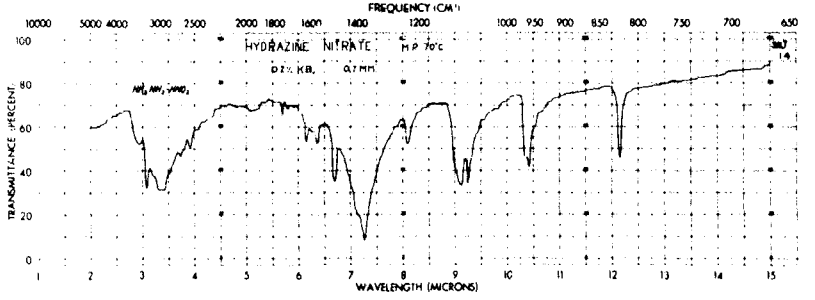

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRIAMINOGUANIDINE PICRATE M.P. 111°C
0.5% KB. 0.7MM
SALT 9
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

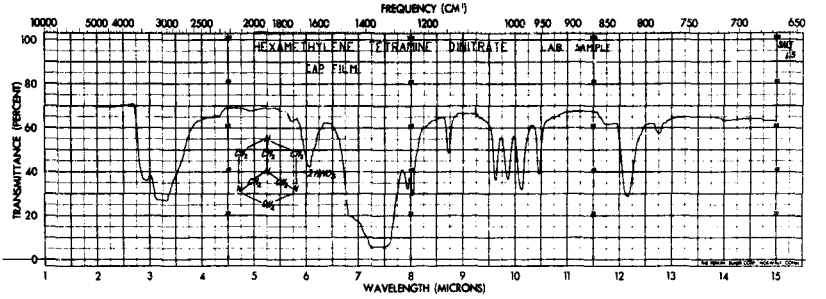

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRIAMINOGUANIDINE PERCHLORATE
0.5% KB. 0.7MM
SALT 10
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

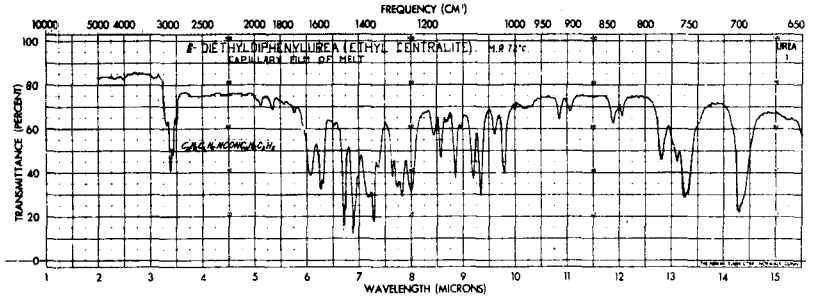

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRIAMINOGUANIDINE HALEITE (ETHYLENE DINITRAMINE) M.P 191.5°C
SALT 11
0.3% KB. 0.7 MM
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

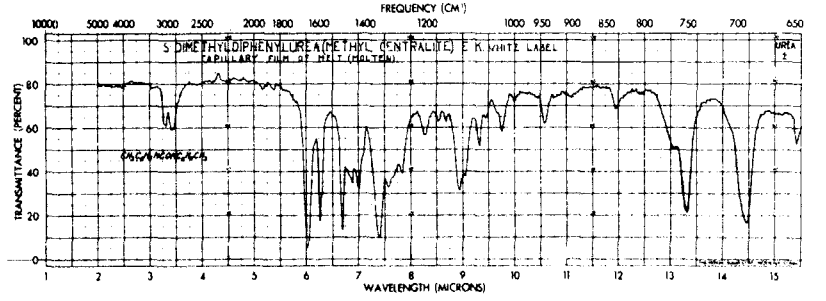

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
ETHYLENEDIAMINE DINITRATE M.P 184°C
SALT 12
0.4% KB. 0.7 MM
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

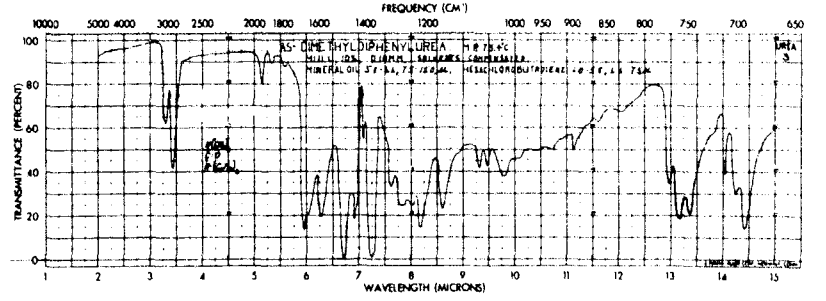

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
UREA NITRATE E & A WHITE LABEL
SALT 13
0.4% KB. 0.7 MM.
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

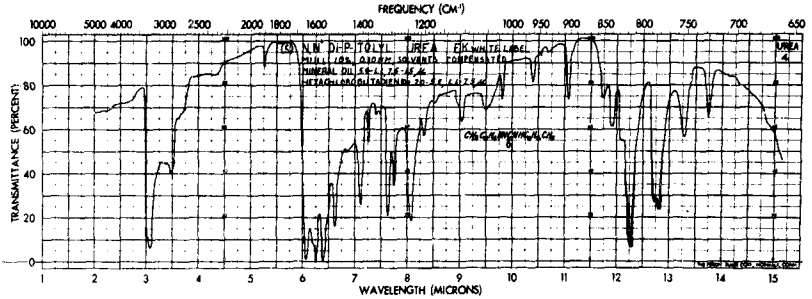

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
HYDRAZINE NITRATE M.P 70°C
SALT 14
0.2% KB. 0.7 MM
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)

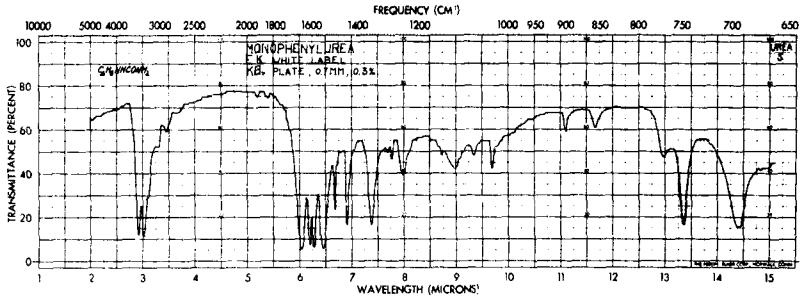

FREQUENCY (CM⁻¹)
HEXAMETHYLENE TETRAMINE DINITRATE LAB. SAMPLE
CAP FILM
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

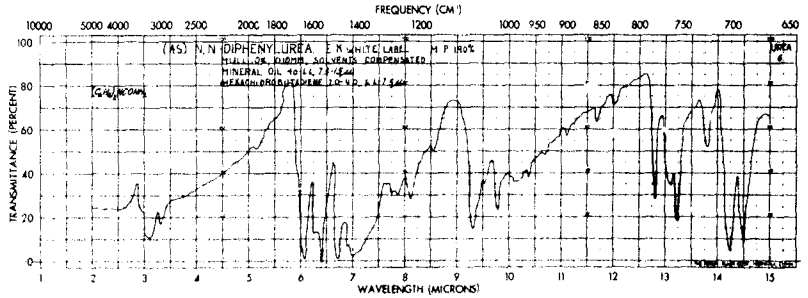

FREQUENCY (CM⁻¹)
α-DIETHYLDIPHENYLUREA (ETHYL CENTRALITE). M.P. 72°C.
CAPILLARY FILM OF MELT
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

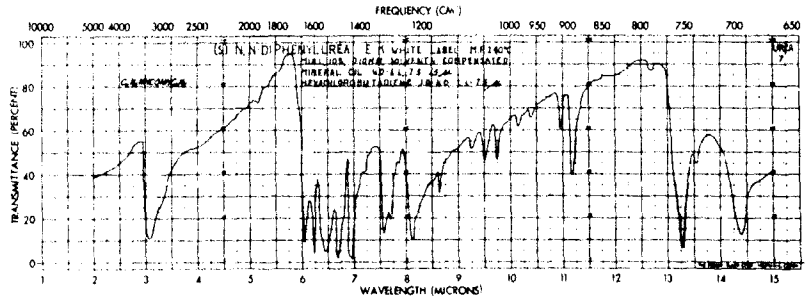

FREQUENCY (CM⁻¹)
S-DIMETHYLDIPHENYLUREA (METHYL CENTRALITE) E.K. WHITE LABEL
CAPILLARY FILM OF MELT (MOLTEN)
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

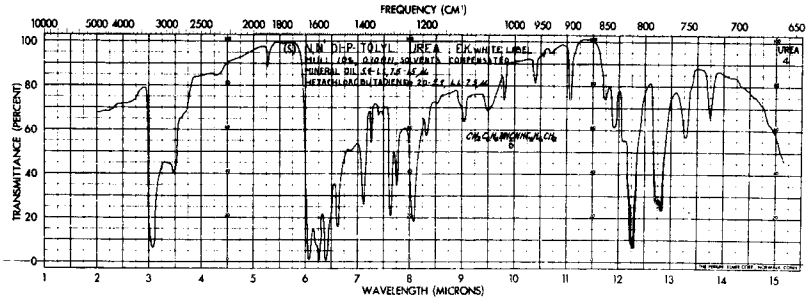

FREQUENCY (CM⁻¹)
AS-DIMETHYLDIPHENYLUREA M.P. 79.4°C
MULL (OIL DISPERSION) SPECTRUM
MINERAL OIL
TRANSMITTANCE (PERCENT)
WAVELENGTH (MICRONS)

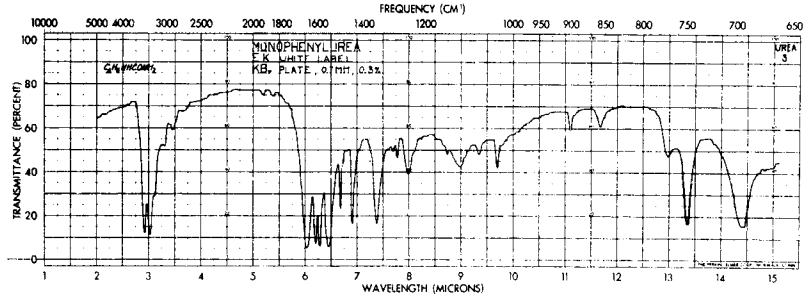

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
UREA 4

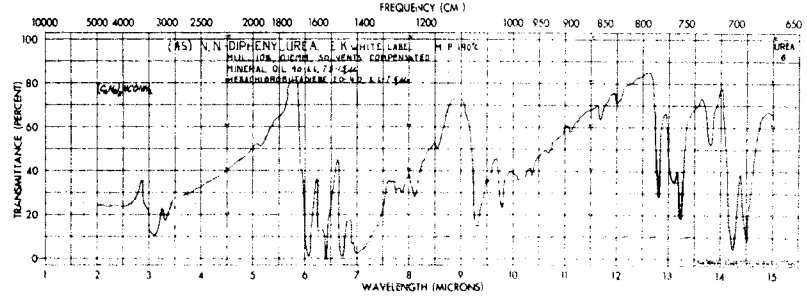

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
MONOPHENYL UREA
E.K. WHITE LABEL
KBr. PLATE, .07MM, 0.5%
UREA 5

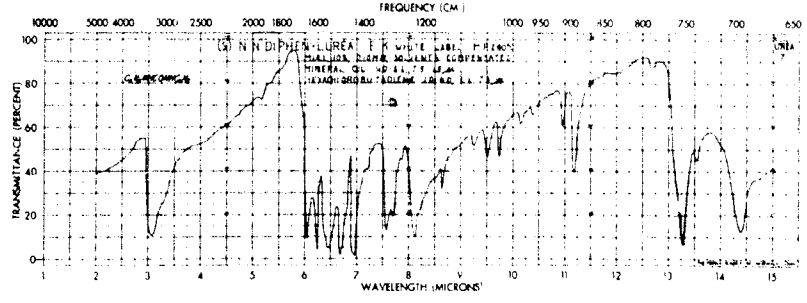

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
(AS) N,N DIPHENYL UREA E.K. WHITE LABEL M.P. 180°
UREA 6

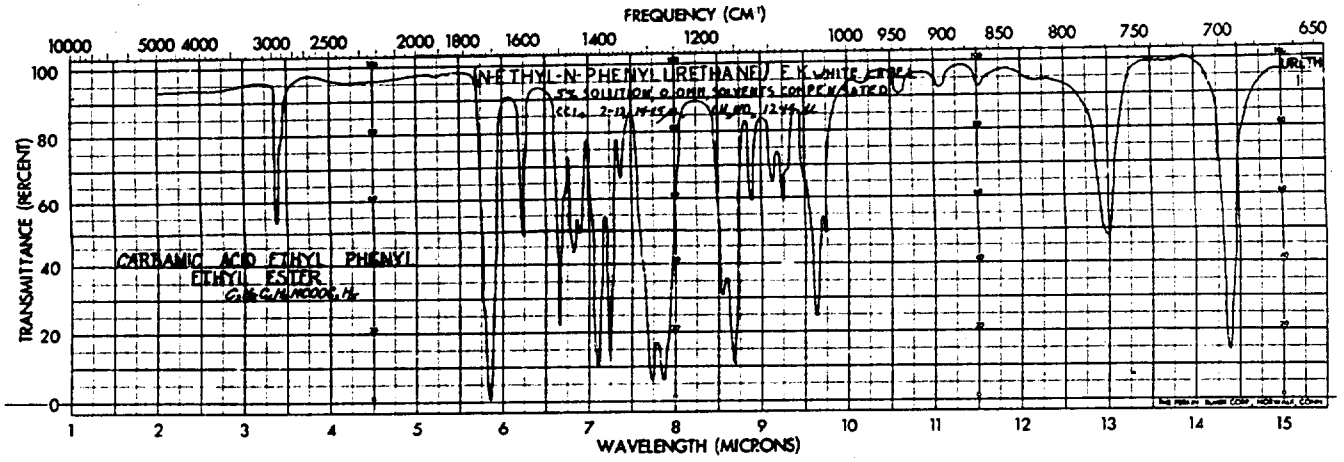

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
(S) N,N DIPHENYL UREA E.K. WHITE LABEL M.P. 180°
UREA 7

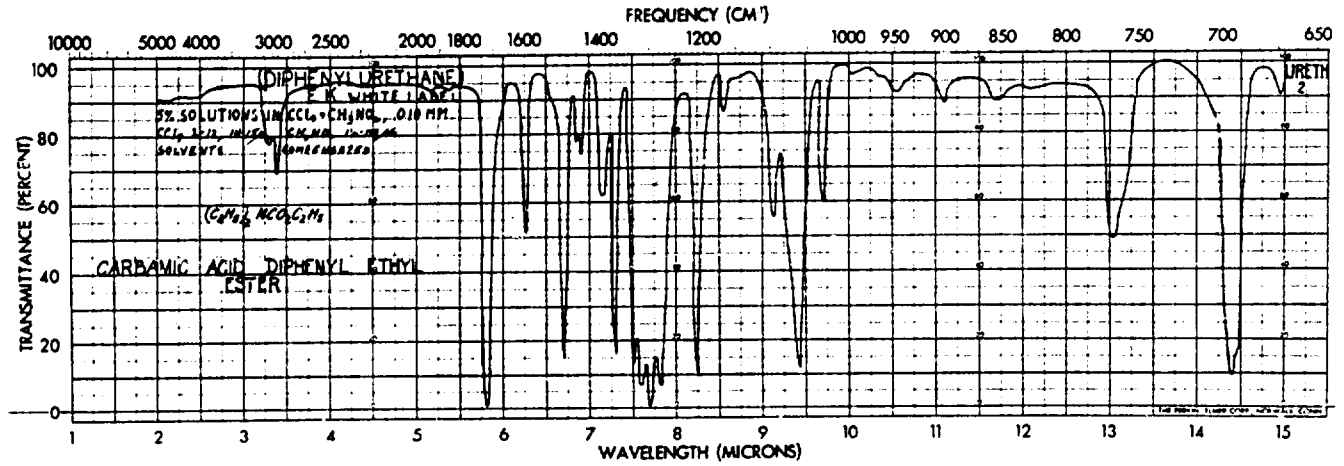

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
UREA 4

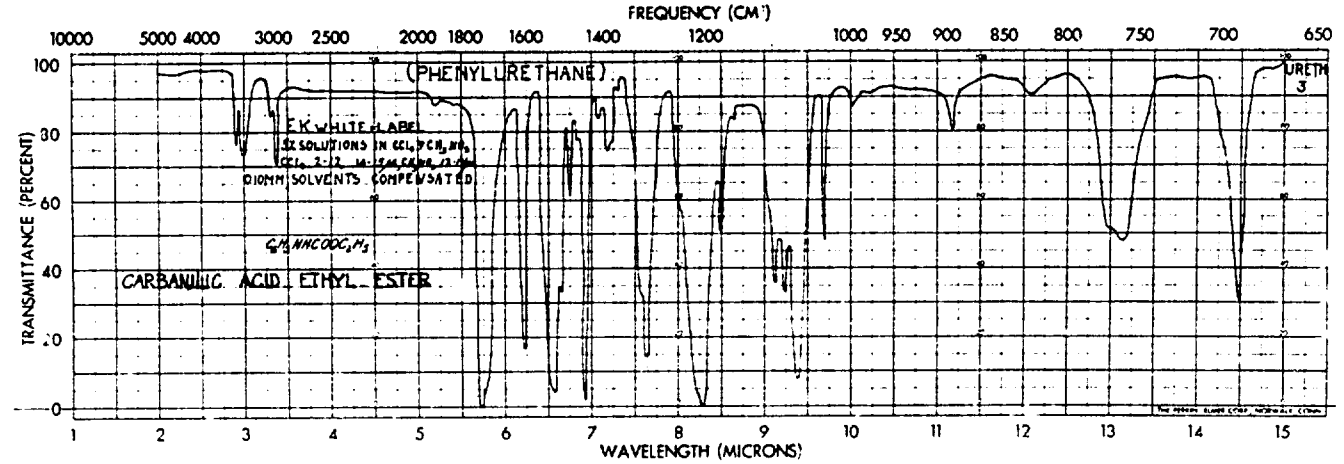

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
MONOPHENYLUREA
E K WHITE LABEL
KBr PLATE, 0.1MM, 0.3%
UREA 3

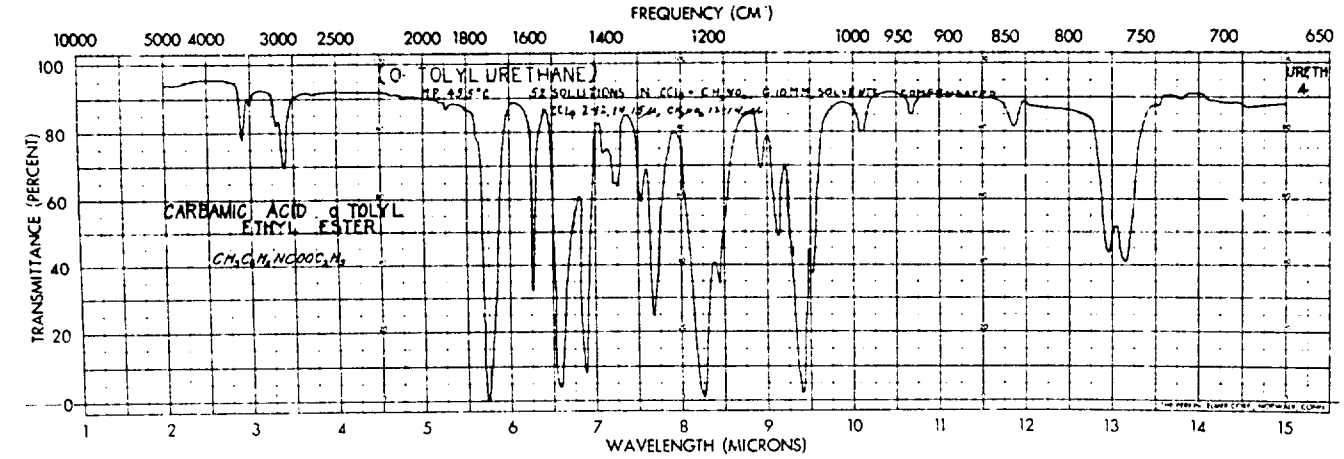

FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
UREA 6


FREQUENCY (CM⁻¹)
10000 5000 4000 3000 2500 2000 1800 1600 1400 1200 1000 950 900 850 800 750 700 650
TRANSMITTANCE (PERCENT)
100 80 60 40 20 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
WAVELENGTH (MICRONS)
UREA 7









UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Picatinny Arsenal, Dover, New Jersey	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP

3. REPORT TITLE

Compilation of Infrared Spectra of Ingredients of Propellants and Explosives

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (First name, middle initial, last name)

Frank Pristera, Walter E. Fredericks

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
Sept 1969	57	

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Technical Memorandum 1887
b. PROJECT NO. c. AMCMS Code #4930.11.1161.1 d.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

10. DISTRIBUTION STATEMENT

Each transmittal of this document outside the agencies of the U.S. Government must have prior approval of the Scientific and Technical Information Branch, Picatinny Arsenal, Dover, N. J. 07801

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY

13. ABSTRACT

A comprehensive compilation consisting of 176 infrared spectra of ingredients of propellants and explosives has been prepared and is presented herein. The spectra are arranged in the following groups, which are listed alphabetically, Acetates, Amines, Esters, Metal Organics, Misc., Polymers, Nitro Amines, Nitro Aromatics, Organo Nitrates, Phosphates, Phthalates, Salts, Ureas, Urethanes. Within each group the individual spectra have been arranged in such a way so that related compounds are placed together.

DD FORM 1 NOV 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

UNCLASSIFIED

Security Classification